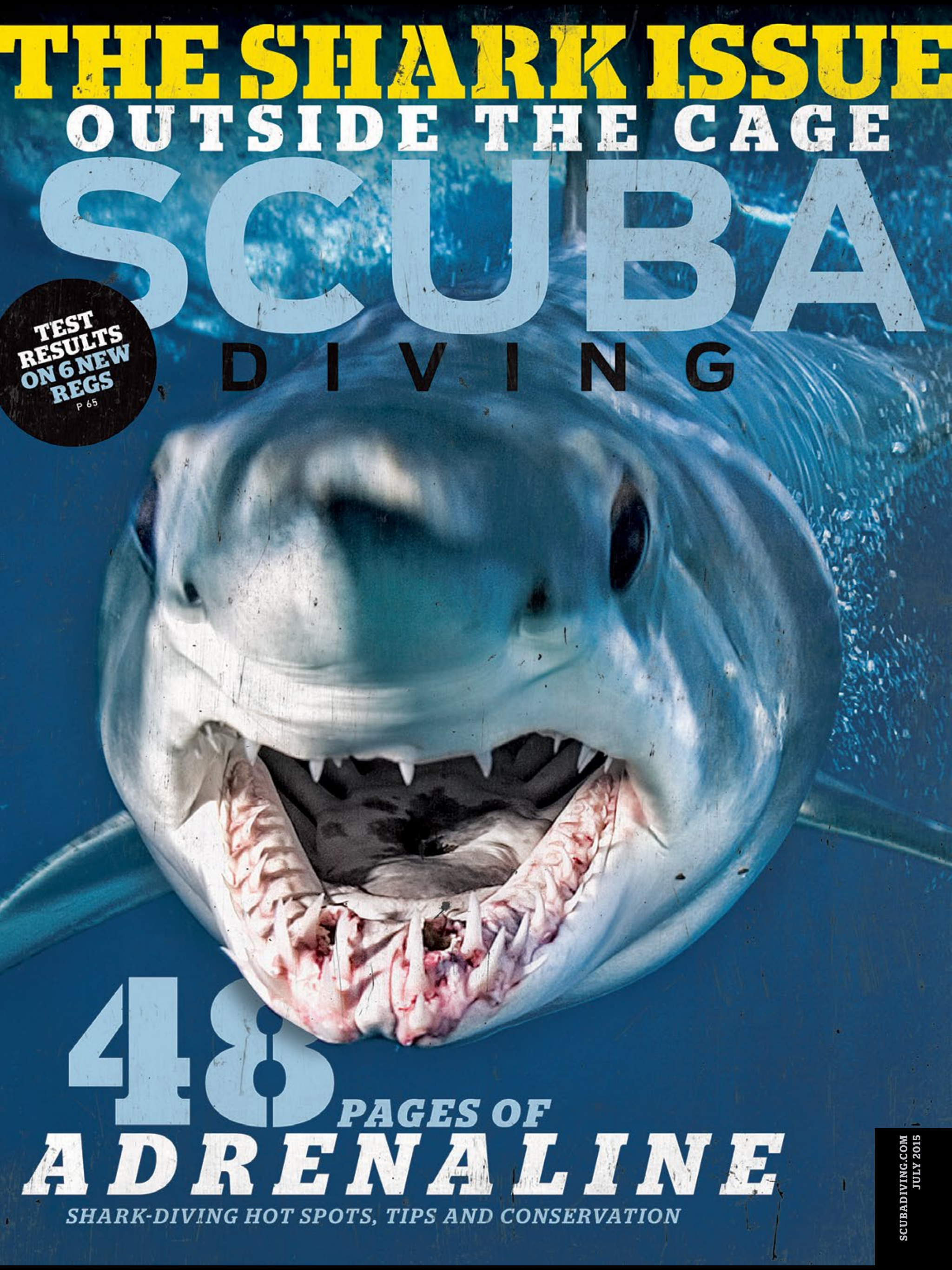


THE SHARK ISSUE

OUTSIDE THE CAGE

SCUBA

DIVING



TEST
RESULTS
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PAGES OF

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SHARK-DIVING HOT SPOTS, TIPS AND CONSERVATION

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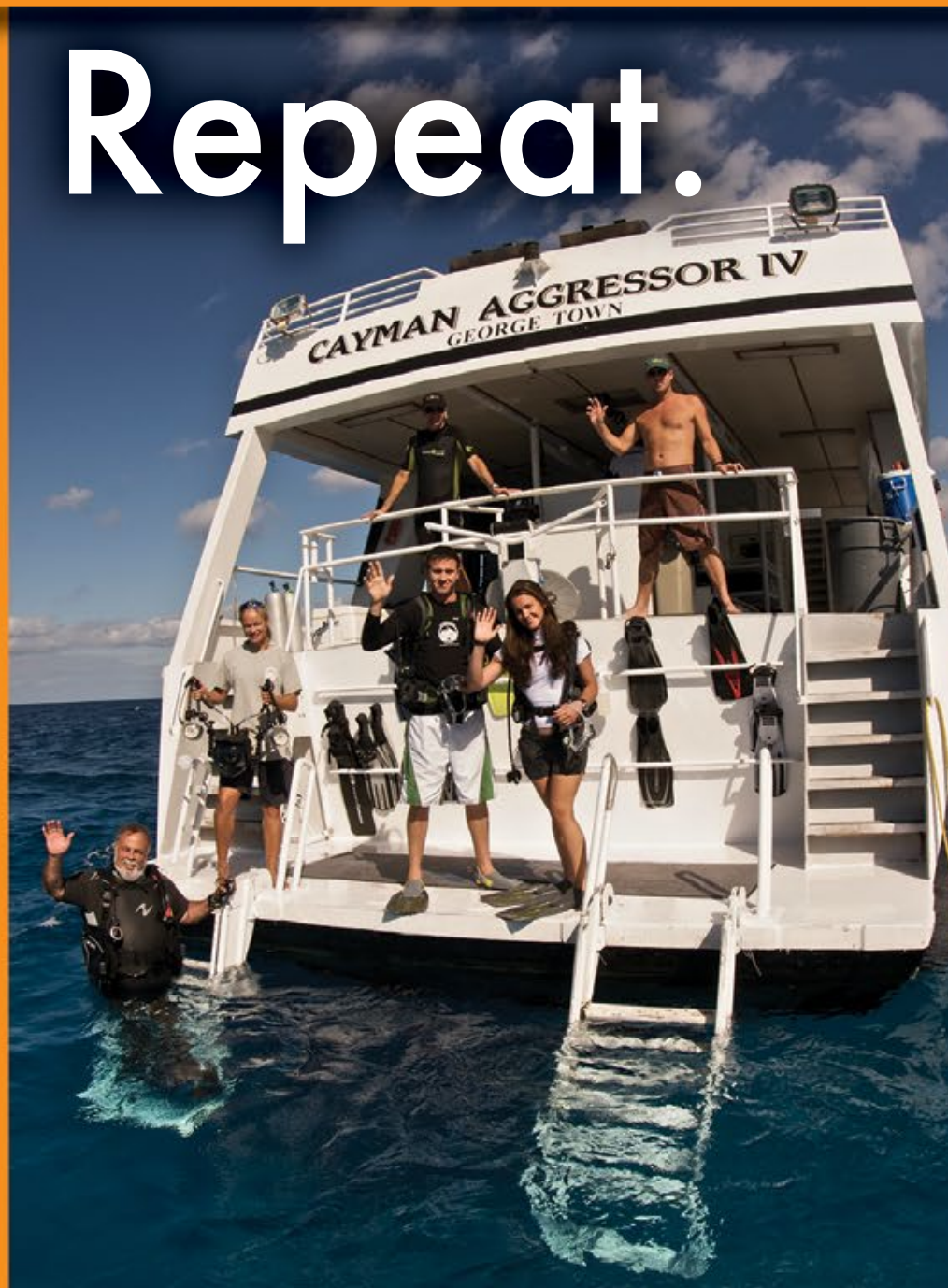
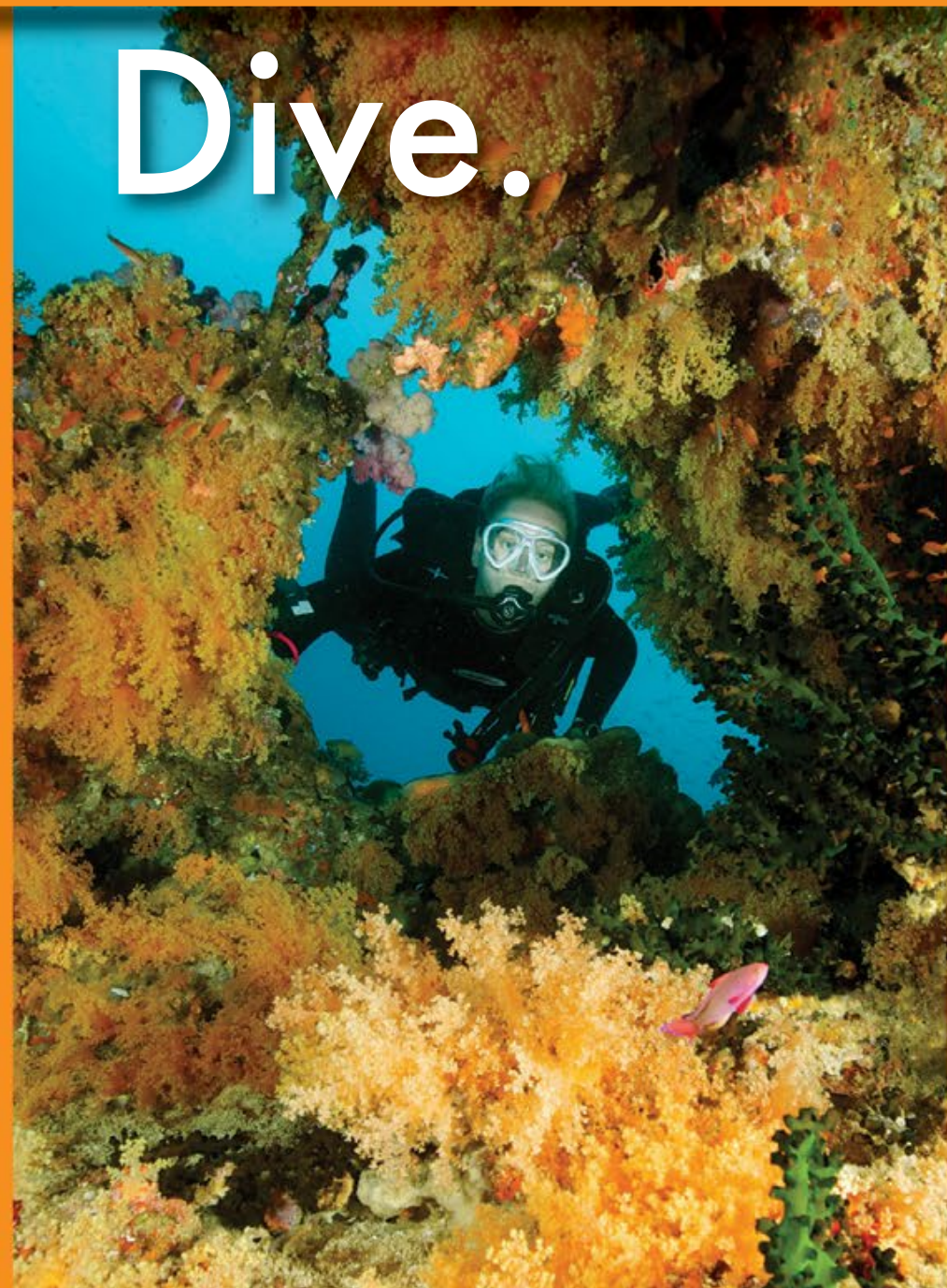
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ON THE COVER

A shortfin mako
at Cape Point,
South Africa.

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OCEANWIDEIMAGES.COM

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THE SHARK ISSUE

One hundred million is one of those numbers that humans have difficulty conceptualizing; we can't visualize it the way we can, say, two kittens, 25 dive boats or 100 pizza pies. But every year it's estimated that 100,000,000 sharks are killed. This issue is devoted to these magnificent fish, and we hope it helps you wrap your brain around our message: It's time for divers to take action.

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Elena Kalis Bahamas

"Original underwater photography is hard to come by, but Elena Kalis encapsulates whimsical emotion in every frame. Combining extraordinary styling with striking portraits, she makes you think 'I wish I'd thought of that', and despite the way water warps colour, works exceptionally with the palettes of scenes and subjects. Elena excels in a specialism which is particularly difficult to master to such an extent and is an artist in her own right."

- Lorna Dockerill, editor (Professional Photographer Magazine UK)



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SAVE OUR SHARKS

As we went to press, Discovery Channel announced that Shark Week — its annual summertime programming blockbuster — would air a month earlier than usual, from July 5-12. In the past, we've been dismayed by the sensationalized fake stories — and fear factor — presented during the week. (Maybe Discovery Channel got the message; the network's president says this year only authentic programming will be shown.)

We wanted this issue, which is completely devoted to sharks, to reflect how we regard these fish — with respect, awe and a commitment to their protection. From stunning photography showing sharks in

their natural habitat to profiles of the people who have devoted their lives to shark conservation to a timeline of shark-related pop culture, this issue is meant to dispel the myths and misconceptions

surrounding these beautiful and beleaguered animals.

As a staff, we've dived with sharks all over the world, including Fiji, Indonesia, Cuba, Florida, Bahamas, Bay Islands and Belize. (For Mary Frances Emmons' stories on shark diving off Jupiter, Florida, and in Eleuthera, Bahamas, turn to pages 22 and 40, respectively.)

We know that some divers find them scary. But what we divers should really be frightened about is that at the rate we're killing sharks — estimated to be 100 million per year — they will become extinct.

In recent years, shark conservation has taken

center stage for many of us, both inside and outside the industry. For our part, we've not only presented articles that showcase where you can dive with these animals, but we've also advocated for their protection and urged readers to join us.

As you thumb through this issue, we hope you'll take a moment to think about how you can help. One way: Get involved in efforts to stop shark finning at wildaid.org, sharksavers.org and sharkangels.org. — PATRICIA WUEST, EDITOR-IN-CHIEF



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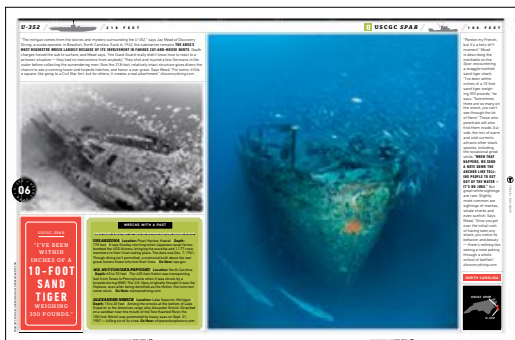
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LETTERS

FACT-CHECKING

I just wanted to bring attention to a minor error on page 44 in the May issue in the sidebar “Wrecks with



a Past.” It pertains to the USS Arizona. After just returning from Pearl Harbor, I found it odd that the depth of the wreck was listed at 170 feet. According to the National Park Service, the wreck lies in approximately 40 feet of water. Only NPS divers are allowed on the site. The memorial is

a very special site that is a must-visit for divers in Oahu. — GARRETT CURTIS, BIRMINGHAM, ALABAMA

Thanks for setting the record straight, Garrett. The USS Arizona is off-limits to all divers except those working for the National Park Service. The explosion and subsequent fires on the Arizona during the attack on Pearl Harbor on Dec. 7, 1941, killed 1,177 sailors and marines instantly; 319 sailors and 15 marines (on or off the ship) were officially Arizona survivors. Crew members who survived the attack have the right to have their cremated remains interred inside. If you were a crew member before that day, you have the right to have your ashes scattered over the ship.

According to NPS: “In both cases, the common thread is that these men were at one time in their Navy careers assigned to the USS Arizona. On April 12, 1982, the ashes of retired Navy Chief Petty Officer Stanley M. Teslow were interred, becoming the first USS Arizona survivor to return to his ship. [Since then,] surviving crew members have rejoined their shipmates in simple and private ceremonies, complete with a two-bell ceremony from the Fleet Reserve Association; a rifle salute from the U.S. Navy or Marine Corps; and a

benediction with the echo of Taps being played across the harbor. The services are conducted inside the memorial and consist of an invocation, funeral ceremony, and a flag presentation to the family. Following the ceremony, the urn is carried from the memorial to the dock area and presented to divers, who swim the urn into the open barrette of gun turret number four and proceed to a large open ‘slot’ that measures approximately 6 inches by 5 feet. The urn is placed into this slot and slides into the ship.”

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THE SHARK





OUTSIDE THE CAGE

From **PROFILES** of six of the world's best-loved sharks to **ESSAYS** by leading conservationists to divers who tell you **WHAT IT'S LIKE** to rescue a dying shark – or tag a very-much-alive one – to a **PORTFOLIO** of stunning images from around the world, we've created this special issue full of **TIPS** and **ADVICE** for just one reason: To persuade you to go out and dive with a shark. We're pretty sure you'll be glad you did.

MAKOS

THEY MIGHT LOOK LIKE SKINNY GREAT WHITES, BUT THESE LIGHTNING-FAST SHARKS ARE IN A LEAGUE ALL THEIR OWN

BY TRAVIS MARSHALL

They're not the biggest sharks in the sea, but they just might be the fastest — and the twitchiest.

Shortfin mako sharks are sometimes described as miniature great whites on amphetamines. These toothy sharks look like a shrunk-down version of the ocean's top predators, but they act totally different. While great white sharks slice slow, graceful circles around a diver, watching with an inquisitive eye, makos are twitchy sharks, hopped up on adrenaline, that blast through a chum slick, offering a split-second glimpse before they disappear into the abyss.

Thought to be the fastest sharks in the ocean, makos have an estimated top speed burst of about 45 mph. They can achieve these speeds thanks, in part, to their warm body temperature, which stays between 7 and 10 degrees warmer than the water and gives them energy. Like great whites, makos are known to jump out of the water, sometimes up to 20 feet in the air, though scientists haven't found the driving force behind this behavior.

Makos are pelagic sharks that live throughout the world's oceans, but there are only a handful of places where divers have reliable encounters with these incredible creatures.

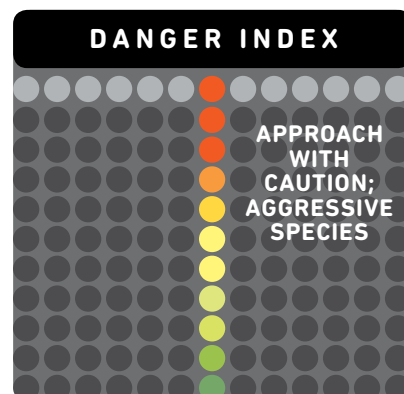
SAN DIEGO

Mako populations have been rebounding in recent years

off the coast of San Diego, where free divers can join charters like those offered by SD Expeditions (sdexpeditions.com) for the chance to go cage-free with these impressive predators.

AZORES

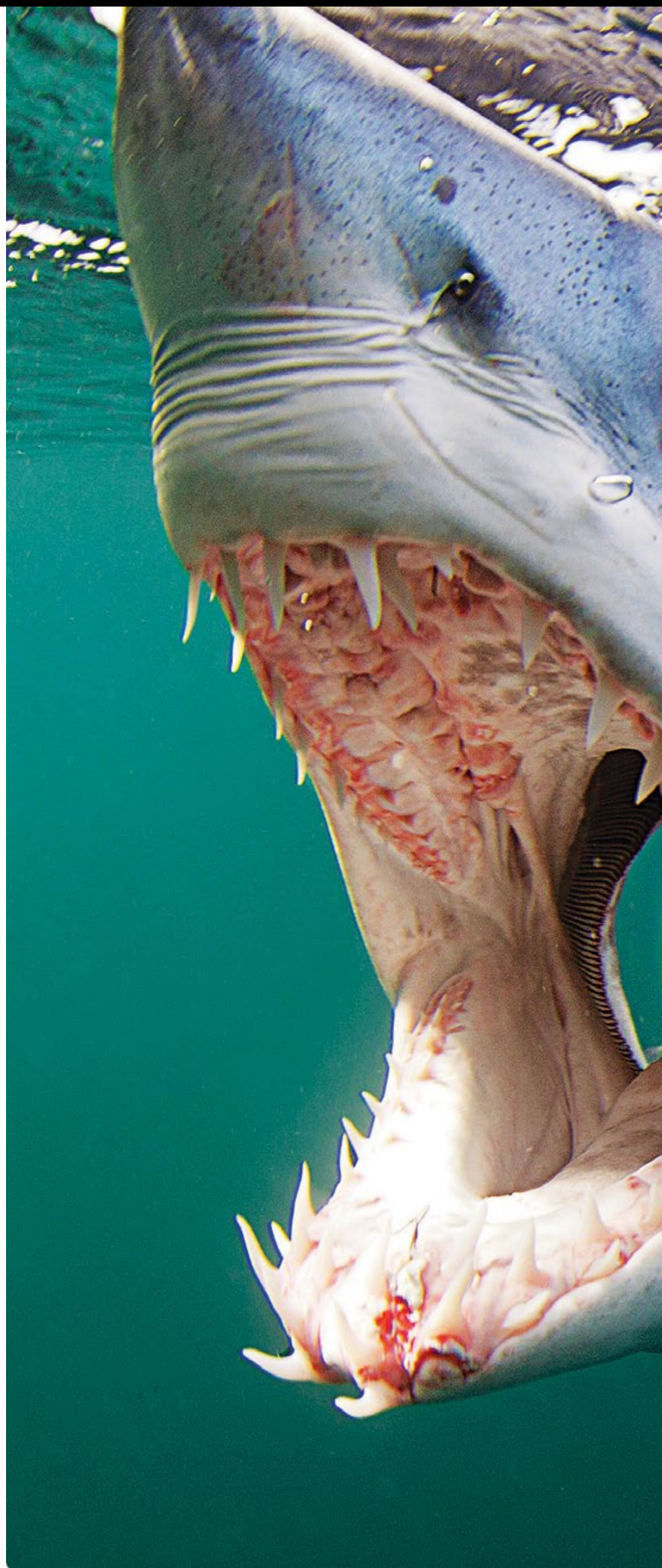
The remote islands of the Azores sit along the mid-Atlantic ridge, a vast underwater mountain range that cuts through the middle of the Atlantic Ocean. From July to October, dive operators like CW Azores



(cwazores.com) offer blue-water diving trips to swim with makos in the open ocean.

RHODE ISLAND

Most divers wouldn't immediately think of Rhode Island as a shark-diving hot spot, but during the summer months, when the Gulf Stream moves close to shore, this stretch of New England coastline becomes a haven for makos and other sharks, as game fish move closer to shore. A number of fishing boats like Snappa Charters (snappacharters.com) now offer trips to see them in their element.



PROFILE

ESSAY

PROFILE

**FUN FACTS**

With a top speed of more than 45 miles per hour, shortfin mako sharks (*Isurus oxyrinchus*) are thought to be the fastest shark species. They can be easily identified by their teeth, which are visible even when their mouths are closed. These sharks can have up to 18 pups at a time, and are listed on the IUCN Red List as Vulnerable.

TERRITORY

Shortfin makos are found in temperate and tropical seas worldwide, but San Diego, Azores



and Rhode Island offer reliable encounters.

BEHAVIOR

Makos can leap up to 20 feet out of the water, though scientists are unsure of the reason for this behavior. Makos are aggressive hunters that feed primarily on schooling fish like tuna, mackerel and swordfish.

SIZE

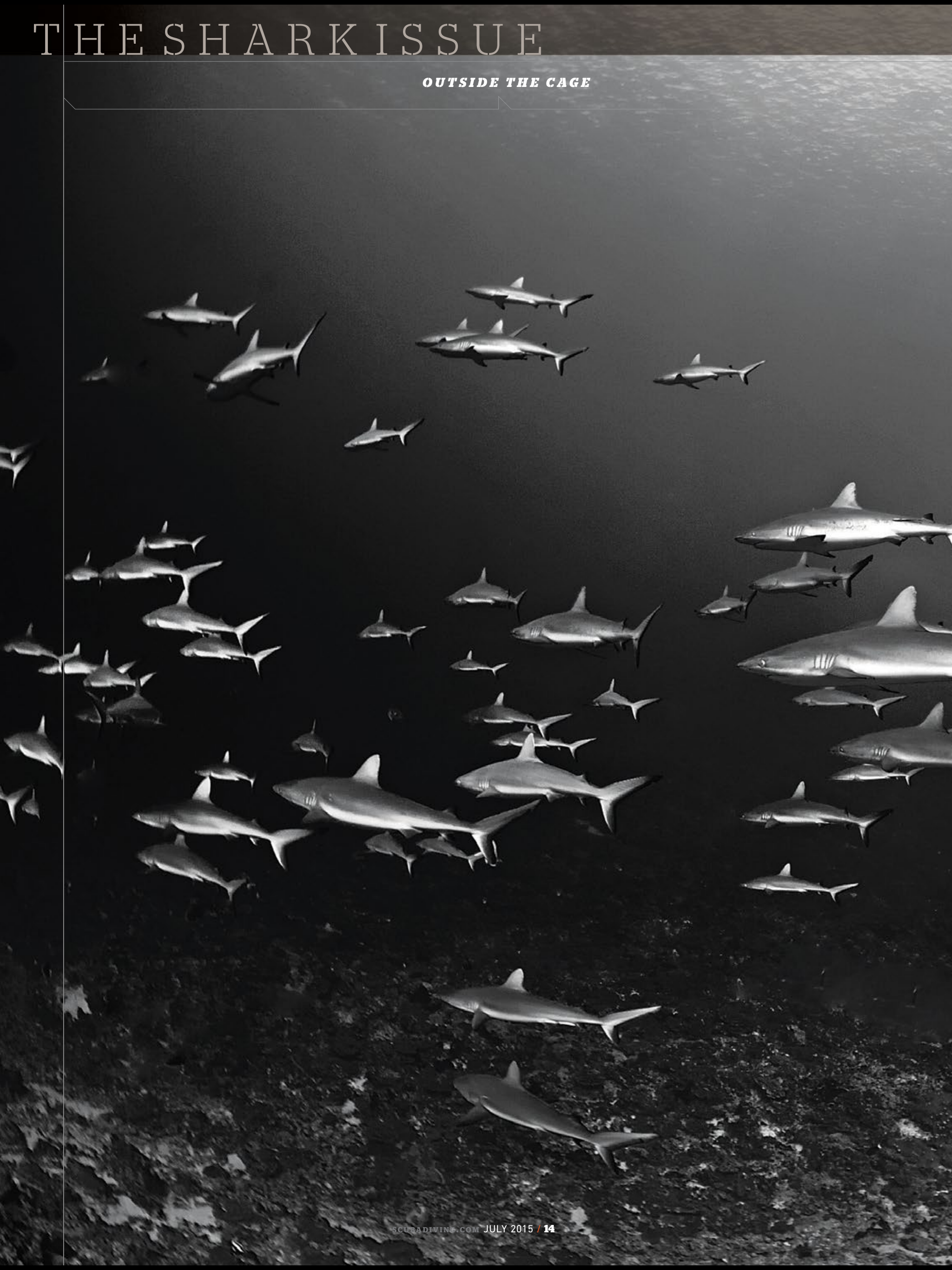
They average between 6 and 9 feet in length.

> sharksavers.org



THE SHARK ISSUE

OUTSIDE THE CAGE



Real, Simple

FAKARAVA, FRENCH
POLYNESIA

I believe in simplicity — telling stories with as little as possible, where less is indeed more. On a shoot in Fakarava for Blancpain Swiss watches, I decided to do just that.

No fancy lighting, dramatic angles or killer action sequences — not even color. Just a simple black-and-white wall of sharks.

Nature provided the ultimate scene — gray sharks, silvertips and blackfins all are frequently found here — I just had to capture it the way it is. It's a different way of looking at things that requires some planning — ironically, keeping it simple can be rather difficult because you want to achieve a powerful effect but with fewer tools or tricks to work with. The more you take out, the more you actually have to put in. Simplicity becomes a complicated process. I love it.

PHOTOGRAPHER

Aaron Wong

CAMERA GEAR

Nikon D3, Seacam housing,
10-17mm lens





Becoming the Shark Lady

WHEN PIONEER MARINE BIOLOGIST DR. EUGENIE CLARK DIED THIS PAST FEBRUARY, SHE HAD COMPILED A NEARLY 75-YEAR LEGACY OF SCIENTIFIC RESEARCH BY BROOKE MORTON

Credit the New York Aquarium with Dr. Eugenie Clark's lifelong devotion to fish. At age 9, she had an overwhelming desire to be in their world, and that passion inspired her to become an ichthyologist, writer and explorer.

She wrote three books, 80 scientific treatises, and more than 70 articles and papers; she had four species of fish named for her. In 2014, after Clark was named Beneath the Sea's Legend of the Sea, contributor Brooke Morton interviewed "The Shark Lady" for our sister magazine, *Sport Diver*. The following is an excerpt from that interview.

Favorite shark encounter?

I was out of the water, looking into the shark pen at Cape Haze Marine Laboratory (now known

as the Mote Marine Laboratory) in Sarasota, Florida. I realized that our lemon sharks had learned to push the right underwater target to release food. We had trained sharks for the first time.

You sustained a shark bite while in a car. What happened?

I was driving to a lecture for schoolchildren. On the front seat next to me was a tiger shark jaw. Running late, I stopped abruptly for a red light and stuck my arm out to prevent the jaw from cutting the dashboard. Instead, the teeth sliced my arm. The students were most interested in the bite-mark circle.

Most surprising discovery?

I found that one fish, the belted sandfish, could change sex from

female to male – and vice versa – in as little as 10 seconds.

How has the gender gap changed for female scientists?

Tremendously! When I started, I was one of few females in the field – and the only one studying sharks. Now there are lots of female students of elasmobranchs. The shift can be seen in professional organizations, such as the American Elasmobranch Society, which started out with one female, and now has more than 50 percent female membership.

Greatest accomplishment?

My four children, the many friends I've made in the diving world, and to have a small part in inspiring an interest in sharks and marine life in children.

BROADNOSE SEVENGILL

The broad-nose sevengill shark (*Notorynchus cepedianus*) is named for its seven paired gill slits. It belongs to the order of "frilled sharks," which are thought to be some of the oldest surviving species of sharks, and is listed on the IUCN Red List as Data Deficient.

TERRITORY

Sevengill sharks are common in temperate waters and are often found in shallow depths.

BEHAVIOR

They feed on other sharks, fish and marine mammals, and sometimes scavenge dead fish. They may hunt in packs, but it is unknown whether these packs show cooperative behavior. They are known to lift their heads out of the water to look around, a behavior called "spy hopping," and can be aggressive in the presence of food.

SIZE

They range in length from 6.5 to 10 feet.

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THE SHARK ISSUE

Black Magic

ALDABRA, SEYCHELLES

This photo was taken one evening on Aldabra, Seychelles. At this massive coral atoll, the world's wildest and most beautiful marine life comes together.

I always see sharks shot on a nice clear background, but I wanted to try something different. Setting up my lights and using the sunset as my backdrop, I staged a model shoot for the sharks. The easiest part was setting the light. The hardest part was getting the blacktip reef sharks to pose in the natural studio.

Luckily in Aldabra, you don't need to use bait. All you have to do is splash the water hard, and the sharks come zooming in. The splashing excites them, perhaps because they think it's a distressed fish or an animal that has fallen into the water.

PHOTOGRAPHER

Imran Ahmad

CAMERA GEAR

Nikon D4, Seacam housing, RGBLue Lights and Ikelite 161 strobe



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Anywhere you make a giant stride, you stand a chance of encountering a shark. So we thought we'd MapQuest a dozen of the world's best encounters, from carpet sharks like bottom-dwelling wobbegongs to massive filter-feeders like whale sharks. In South Australia and South Africa, in the Caribbean and Indo-Pacific, here are the best times of year to plan a date with 14 very special sharks.

SHARK

OCEANIC WHITETIP SHARKS

RANGE Tropical and warm, temperate seas worldwide **BEST DIVE** Elphinstone Reef, Red Sea (Egypt) **DIFFICULTY** Advanced **SEASON** October to December, though year-round sightings are possible **OPERATOR** aggressor.com

**THRESHER SHARKS**

RANGE Temperate and tropical oceans worldwide **BEST DIVE** Monad Shoal, Malapascua, Philippines **DIFFICULTY** Advanced **SEASON** Year-round; February to May has calmest conditions **OPERATOR** evolution.com

**GRAY REEF SHARKS**

RANGE Coastal, shallow waters of the Indian and Pacific oceans **BEST DIVE** Blue Corner, Ngemelis Island, Palau **DIFFICULTY** Advanced **SEASON** Year-round **OPERATOR** samstours.com

WOBBERGONG SHARKS

RANGE Shallow temperate and tropical waters of the western Pacific and eastern Indian Ocean, chiefly around Australia and Indonesia **BEST DIVE** Arborek Jetty, Raja Ampat, Indonesia **DIFFICULTY** Beginner **SEASON** Year-round **OPERATOR** misool.ecoresort.com

WHALE SHARKS

RANGE Tropical and warm, temperate seas worldwide **BEST DIVE** Ari and Baa atolls, Indian Ocean (Maldives) **DIFFICULTY** Snorkel only **SEASON** North-west monsoon season (May to December), whale sharks are on the western side of the Maldives; south-east monsoon season (December to April), eastern side **OPERATOR** fourseasons.com

**TIGER SHARKS**

RANGE Tropical and temperate waters; especially common around central Pacific islands **BEST DIVE** Bisto, Beqa Lagoon, Fiji **DIFFICULTY** Advanced **SEASON** Year-round, though less prevalent when bull sharks are in the area **OPERATOR** aquatrek.com

**GREAT WHITE SHARKS**

RANGE Temperate coastal and offshore waters worldwide **BEST DIVE** Port Lincoln, South Australia, cage diving **DIFFICULTY** Advanced **SEASON** Year-round **OPERATOR** sharkcagediving.com.au

**BROADNOSE SEVENGILL SHARKS**

RANGE Western Pacific, eastern Pacific, and southern Atlantic off Argentina and South Africa **BEST DIVE** False Bay, South Africa **DIFFICULTY** Advanced **SEASON** Year-round **OPERATOR** sharkexplorers.com



FINDER

MR. JORDAN'S WILD RIDE

Randy Jordan is the only operator hand-feeding sharks in U.S. waters. His Jupiter, Florida, charters are booked months in advance. But is this high-adrenaline dive really good for Jordan, the sharks or the dive industry?

TEXT BY MARY FRANCES EMMONS PHOTOS BY CRAIG DIETRICH

Whitetips and wobbies in Indo. Silkies and Caribbean reefies in Cuba. Hammers in Baja and Tahiti. Great whites in South Africa. I've dived with sharks in a lot of places. But never before have I been circled by bull sharks. It's an interesting feeling.

It's our first dive with Emerald Charter's Randy Jordan. He runs a shark-feed dive out of Jupiter, Florida, that is one of the most polarizing dives in the industry today — some local operators shun him, and the state of Florida convicted him in March of illegally feeding sharks inside state waters.

We've descended to the *Esso Bonaire III*, Jordan's shark arena, hoping for lemons, tigers, silkies, hammers or duskies. Only bulls are present, slyly coming in from all angles, showing no respect for the stage-like layout where divers sit along the wreck's stern, 20 feet above the action, until Jordan deems it safe for the bravest to zoom down to the sand where he's hand-feeding the world's most vilified predators.

Leaving the *Bonaire*, three of us fall behind. I can see strobes in the distance, but soon we decide, meh, we're done. Up we go. That's when

we notice the bulls.

My colleague Tara Bradley, photographer Craig Dietrich and I put ourselves back to back. Three medium-size bulls go round and round — are they getting closer? *Are we being circled?* I think, my brain catching up to the moment.

Back on board I pose the question out loud. "Yes. Yes, we were," Bradley answers. We look at each other and burst out laughing.

◊ ◊ ◊ ◊

Jordan, 60, is a PADI instructor who has been diving for 30 years. For five years he has run daily three-tank shark dives from his 42-foot *Emerald*. The nitrox-only shark-feed and spearfishing trips are addictive, not least for Jordan, who has an almost supernatural empathy for sharks. Photographers who dive with Jordan will tell you that he somehow knows where the sharks will be on any given day.

"These are not puppy dogs," Jordan says. "Sharks can read your body electricity. If you're chill, they'll come to you."

Jordan isn't just a Pied Piper — he's a one-man band. From ting-tings on his fish stringer to a shaker-

style noisemaker to a horn he says attracts lemons, Jordan keeps up a steady racket. On days with good viz, Dietrich tells me, you can see sharks coming for miles.

Jordan isn't alone in this pursuit — shark diving is one of the fastest-growing segments of diving.

Rick MacPherson is a marine ecologist and senior adviser to the Pew Charitable Trusts Global Shark Conservation Campaign who works with countries around the globe to establish shark-diving guidelines. He also has embarked on the first systematic assessment of shark-diving practices.

"Globally, dive operators are interested in the potentially lucrative nature of the fed-shark dive. Divers are increasingly looking for thrills, and the close viewing of mega-predators fills that niche," MacPherson says.

For Jordan, the business is also a mission. He believes that the best way to protect sharks is to expose humans to sharks in their environment. "It's all about educating divers. Sharks are more afraid of us than we are of them," he says. Jor-

Striped grunts scatter before a shark taking a handout from Jordan.







dan doesn't debate whether shark feeds are a good idea or a bad idea; he leaves that to others. Some conservationists are tolerant of the practice, with caveats.

"More people seeing sharks underwater means more people leaving with a new appreciation for sharks, understanding that they are not the creatures out of *Jaws*. That's important to me as a conservationist," says MacPherson. "Sadly, most dive destinations have seen their shark populations dramatically

reduced, so the only way to see a shark is to attract it with food. But it takes only one sloppy accident to shut down the entire industry."

Jordan acknowledges those concerns. "Getting bit is really bad publicity for sharks," he says. So far the only person to suffer demonstrably has been himself. He lost the top joints of a couple of fingers in a spearfishing mishap, and a 2014 sting operation by the Florida Fish and Wildlife Commission and Palm Beach County Sheriff's Of-

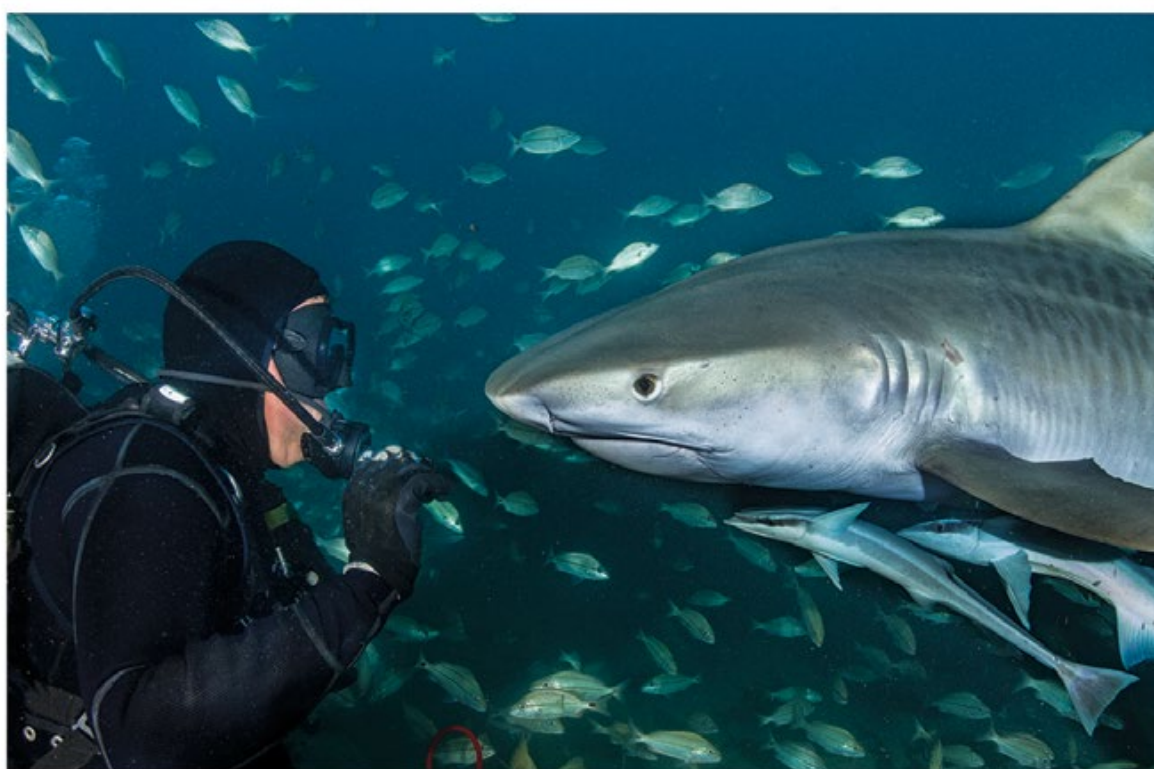
fice led to a misdemeanor or conviction for feeding sharks within state waters.

That is illegal. Past Florida's 3-nautical-mile limit, in federal waters, feeding is permitted. Local operators who don't do feeds claim that Jordan endangers divers by changing shark behavior, although so far there's no evidence of that.

MacPherson says, "Initial research suggests feeding does not negatively alter shark behavior in species observed," mostly bull and tiger sharks. "Changes

in behavior occur just before and during the feed — increase in activity and aggregation — but sharks seem to go back to business as usual immediately after the feeding."

MacPherson adds that "it's important to consider factors such as the dive shops that were being observed." In the study, Bahamas and Fiji operators used rigorous safety protocols, and feedings were highly choreographed. "What does fed-shark behavior look like when such rigor or



NEED TO KNOW

When to Go

Emerald Charters runs shark dives year-round.

Dive Conditions

Water temperatures off Jupiter, Florida, range from the low 70s in winter to the low 80s in summer. Shark dives include both drift and wreck diving.

Operator

Emerald Charters (emeraldcharters.com) runs three-tank trips most days departing at 8:30 a.m. and returning at approximately 3 p.m.

Price

\$100 per diver, not including tanks, which can be rented from Scuba Works (scubaworks.com) for \$15 to \$20 per tank depending on size. A gourmet box lunch is included.

What It Takes

All dives are nitrox-only. Although Jordan accepts anybody he deems a “good diver,” this is advanced diving. You should be comfortable with depth, current, possible poor viz, and the presence of large predators.

routine is not as carefully applied?” MacPherson asks.

○ ○ ○ ○

It's our last day aboard *Emerald*, and Jordan is sawing away at bonito he'll use in his feeds. He's surrounded by eager young spearos watching intently, their faces practically down in the cooler. A group of divemasters and instructors from a nearby shop has come aboard to spearfish and to dive with sharks. They've been out with Jordan before but don't want their

shop name mentioned because its owners don't endorse feeding sharks.

We drop in again on the *Bonaire*, where Jordan and two gorgeous tiger sharks are center stage. Jordan is ringmaster, with one eye on the sharks and one eye on the divers behind him. He uses bait and his movements to keep the animals interested, at times putting both hands around a snout in a gesture that appears to calm the sharks. With two tigers, three bulls, six goliath grouper and 15 divers — half of

Jordan, standing at left, jumps first. The sharks seem to know him (top).

them spearing cobia overhead, half of them photographers with strobes and video lights whirring — it's an underwater circus, an adrenaline-inducing thrill ride. The tigers are stunningly beautiful, swooping close enough to touch the heads of the divers nearest to Jordan, yet they produce no feeling of threat or menace. There's intelligence in their black eyes, and curiosity. Among

the divers, there's overwhelming joy — everybody is high on life, and we all wish it could go on and on.

Back on the *Emerald*, high-fives all around.

“On a good day, this is an epic dive,” says one of the young divemasters. “Six kinds of sharks at once — where can you see that?”

He flashes a smile as dazzling as the point of his spear glinting in the sun, reveling in the sharks, and the cobia he had bagged.

“Even on a bad day, it's a pretty good dive.”

THE SHARK ISSUE

OUTSIDE THE CAGE





Rough Riders

GARDENS OF THE QUEEN, CUBA

Groups of up to 20 silky sharks are predictably found at a few offshore reefs of Jardines de la Reina, or Gardens of the Queen, located off south-central Cuba in the Gulf of Ana Maria.

One morning early this year, I surfaced from a dive on a seamount called Pipin — located in about the center of the archipelago, just west of the Canal de Caballones among underwater canyons and caves — to find a dozen of these oceanic sharks feeding on scraps discarded by fishermen.

As silkies are true oceanic sharks, they are known to be cautious but at times curious about divers. Here in the Gardens of the Queen, I find them rather placid, and I am able to use the technique of tonic immobility — a sort of animal hypnosis — quite easily.

PHOTOGRAPHER

Michael Aw

CAMERA GEAR

Nikon D800, 15mm lens
Seacam housing, dual Ikelite DS 161 strobes



**BLUE SHARK**

The blue shark (*Prionace glauca*) has a sleek, slender body, long snout and a distinctive blue coloration on its back that fades to white underneath. Sometimes referred to as "blue dogs," these sharks can have about 35 pups at one time and are listed on the IUCN Red List as Near Threatened.

TERRITORY

Blue sharks are found throughout both tropical and temperate seas. They are probably the most wide-ranging of all the sharks — one tagged blue shark in New Zealand was later recovered more than 745 miles away off the coast of Chile.

BEHAVIOR

They feed on many different kinds of fish including herring, cod, mackerel, flounders, and small sharks, and invertebrates like squids, crabs, whale carcasses, and occasionally seabirds.

SIZE

Blue sharks can grow to be longer than 10 feet.

➤ sharksavers.org

FREE DIVING TO TAG GREAT WHITES

BY DR. MAURICIO HOYOS PADILLA, AS TOLD TO BROOKE MORTON



To tag a great white, first you must know if it's a player. By that I mean, will it get close? Many are shy. People believe that if a white shark approaches, it attacks. But luring a shark to the research boat takes work, encouragement. We use bait, which we remove when the free divers enter the water, one at a time and with no splash. Splashes scare sharks.

White sharks are ambush predators. We can free-dive with them only in Isla Guadalupe, Mexico, because the visibility is 100 feet — they can't sneak up on us like they could in South Africa, where the water is murky.

Our free divers work in teams of three. It takes focus to tag a shark, so while one diver is tasked with tagging the shark, a second acts like a bodyguard, maintaining visual contact with the animal or animals at all times. If they know they are being watched, they're far less likely to get inquisitive.

The third diver photographs the shark. So far in Isla Guadalupe, 158 individual white sharks have been identified. We want to know whom

we tag: Is it one we have seen before in Isla Guadalupe or a new individual? The pattern of pigmentation around the gills, pelvic fins and tail distinguishes each.

The free diver tasked with tagging must swim within roughly 6 feet of the shark; depending on the shark, this dive takes around two to three minutes. The V16 tag — stainless steel and 3.5 inches long — is shot into the base of the dorsal fin on the left side. We tag only the left side to streamline the process. We need to know where to look to see if an animal has been tagged. If you tag the same animal twice, it will emit two frequencies, which collide and cause problems.

As soon as the animal is tagged, the diver surveys his surroundings, and then heads straight back to the boat. Then we wait for a new shark to approach.

Nature is unpredictable, which is why my trips to Isla Guadalupe last three months. Sometimes we'll tag six sharks in three days, and at other times we'll wait two weeks before seeing one. To tag two sharks in one day is good; five is amazing.



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**GRAVITATION IS NOT RESPONSIBLE
FOR PEOPLE FALLING IN LOVE.**

Albert Einstein



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BLACK/BLUE



BLACK/PINK



BLACK/YELLOW



BLACK/BLACK

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Close Encounter

ISLA GUADALUPE, MEXICO

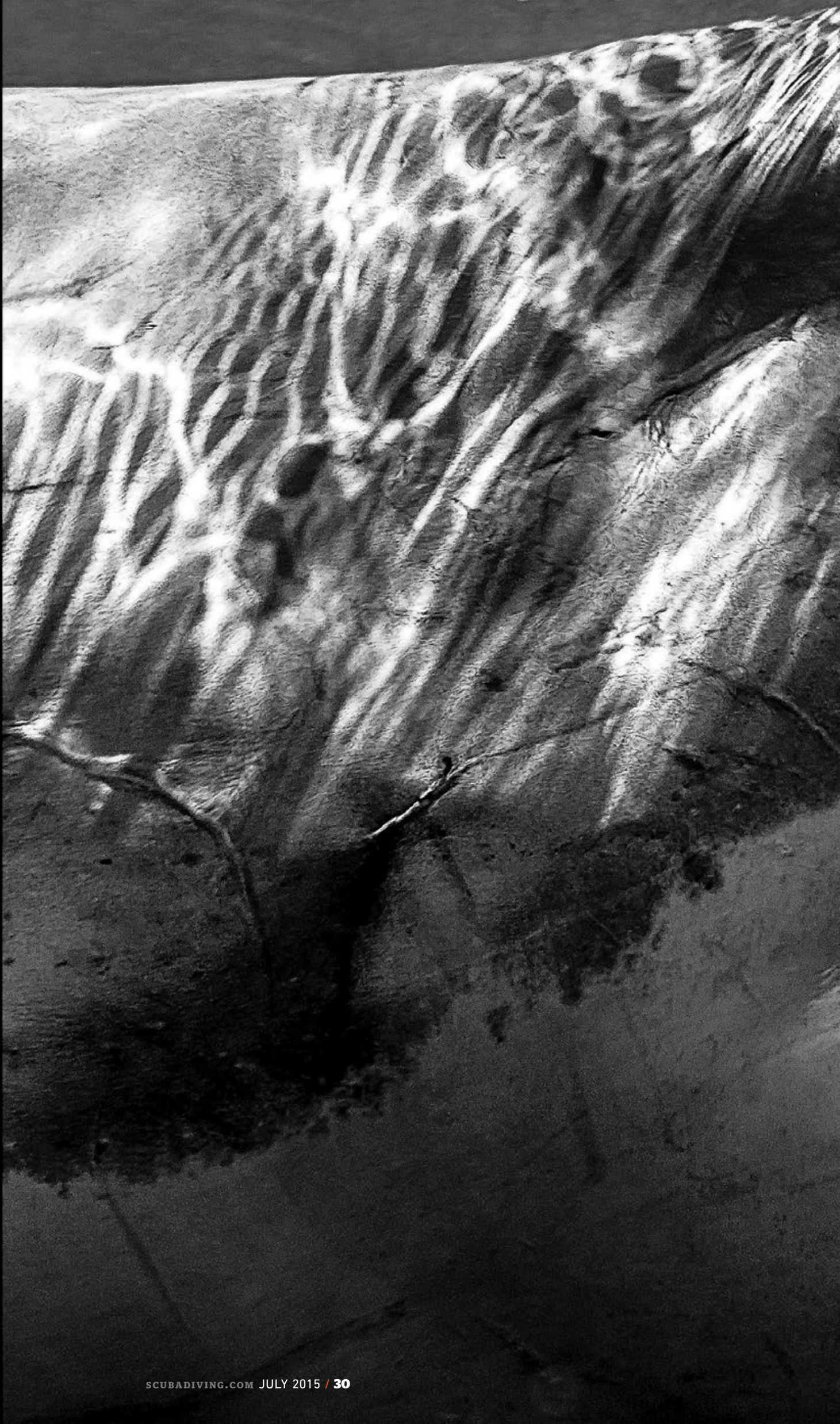
This shot was taken in 2012 aboard the *Solmar V* in Isla Guadalupe. The object in the upper right is a fish head with a rope through its eye socket that the wrangler was using to draw the sharks closer to the divers. The most interesting thing about this photograph to me is that it was taken with a 105mm macro lens. Like everyone else, until the last day of the trip I had been using only wide-angle lenses, which is what common sense tells you that you should use for great whites. On the last day, I decided to try something different and got in with the 105mm. The experience taught me the importance of trying unconventional techniques if you want to get a shot that stands out. This shot would have been impossible with my wide-angle — I would not have been able to get close enough to fill the frame, and even had I been able to get over that hurdle, the shark would likely have come out very distorted.

PHOTOGRAPHER

Todd Brett

CAMERA GEAR

Nikon D800, Nauticam NA-D800 housing, Micro-Nikkor 105mm macro lens



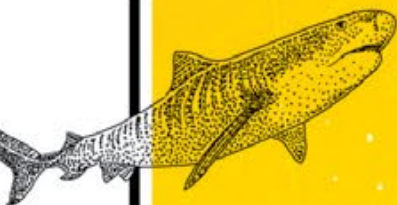


PROFILE

ESSAY

TIGER SHARK

The tiger shark (*Galeocerdo cuvier*) is easily identified by vertical, dark gray to black bars along the body and a broad head and large mouth. They can have litters of 35 to 55 pups. Tiger sharks — the only species in its family that is ovoviviparous (they develop their young as eggs inside their bodies) — use bays and estuaries as nurseries. They are listed on the IUCN Red List as Near Threatened.

**TERRITORY**

Tiger sharks are found globally throughout tropical or subtropical waters. They have also been known to travel long distances — over 1,856 miles in the western Atlantic.

BEHAVIOR

These sharks are thought to have one of the most varied diets, including bony fishes, other sharks and rays, sea birds, turtles, marine mammals and reptiles, crustaceans, and even jellyfish.

SIZE

Tiger sharks average 10 to 15 feet in length, but can grow up to 25 feet.

> sharksavers.org



Becoming a Shark Angel

A RANDOM ENCOUNTER WITH A HAMMERHEAD LED TO ONE WOMAN'S LIFELONG CRUSADE TO PROTECT SHARKS

BY JULIE ANDERSEN

I have always been drawn to sharks. Their powerful grace and presence has fascinated me since we first met. Solo on a safety stop, I suddenly felt I was not alone. Much to my initial terror, a huge scalloped hammerhead appeared next to me. But gazing into the eyes of the animal, I saw life – not a cold, cruel stare. That day sealed my fate. This shark exemplified all that is beautiful on Earth: the extraordinary power of nature, and a vital reminder of what we must respect and protect.

Hooked, I traveled to dive in places famous for sharks. Everywhere I went, I saw the effects of shark finning. I quickly realized I was watching sharks disappear before my eyes. Fueled by passion, I sold my house and business to start Shark Angels, a nonprofit dedicated to giving the world a new view of sharks.

I spent years undercover documenting the heartbreaking destruction. I walked among 7,000 bloody sharks landed in a tuna fishery in Japan, and watched a starving fishing village in Indonesia fin the last of its baby sharks – having decimated the population.

Seven years later, I'm still fighting. And I am filled with hope. Together, we are making a difference. From passing legislation that makes shark fin an illegal substance to developing campaigns to stop the demand in Asia to educating thousands of children, Angels around the world are giving sharks a chance.

Anyone can become a guardian angel to the sharks. Lobby for their protection, vote with your dollars, volunteer, educate, go shark diving to prove their value – just get involved. After all, it's not just about the sharks – it's about the oceans and our collective futures.

To learn more, visit sharkangels.org.

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THE LEGACY OF JAWS

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The movie *Jaws* led many viewers to stay away from beaches when it was released in 1975, and has been widely criticized for promoting negative stereotypes about sharks and their behavior. Peter Benchley eventually regretted writing the book, and in 1995 said: "The extensive new knowledge of sharks would make it impossible for me to create, in good conscience, a villain of the magnitude and malignity of the original. ... If I have one hope, it is that we will come to appreciate and protect these wonderful animals before we manage, through ignorance, stupidity and greed, to wipe them out altogether."

Conservationists hate that the film has made it difficult to convince the public that sharks need protection from humans, not the other way around. But *Jaws* launched the summer-blockbuster genre, and Roy Scheider's line "You're gonna need a bigger boat" is 35th on a list of top 100 movie quotes, and composer John Williams' musical theme is instantly recognizable (*dun-dunh, dun-dunh*).



HOOKED ON SHARKS FOR BETTER OR FOR WORSE, THE MEDIA'S LOVE AFFAIR WITH SHARKS HAS KEPT US ENTERTAINED FOR DECADES. HERE ARE SOME OF THE MOST ICONIC SHARK MOMENTS IN POP-CULTURE HISTORY.



JAWS
JUNE 20, 1975
Steven Spielberg's classic thriller *Jaws* is released, igniting fear in the hearts of swimmers for decades to come.



FONZIE JUMPS THE SHARK
SEPT. 20, 1977
Donning his trademark leather jacket, and water skis, the *Happy Days* star jumps over a shark. This iconic scene marked the TV show's decline in creativity, and the birth of an equally iconic idiomatic phrase.



SHARK WEEK IS BORN
JULY 17, 1988
The first Shark Week airs on Discovery Channel. Since then, summers have never been the same.

1975

1977

1979

1981

1983

1985

1987

1989

1991

1993

1995

1997

1999



LAND SHARK
NOV. 8, 1975
Striking fear in the hearts of apartment dwellers, *Saturday Night Live*'s Land Shark reminded us why we don't open the door for strangers.



JAWS 2 JUNE 16, 1978
Yet again, a fictional man-eating shark wreaks havoc on the citizens of Amity.

JAWS 3-D
JULY 22, 1983
A juvenile great white makes its way into an aquatic theme park, and its mother terrorizes the park workers.



JAWS: THE REVENGE
JULY 17, 1987
But wait, there's more! This time, in the Bahamas.



JAWS OPENS FOR BUSINESS
JUNE 7, 1990
Universal Studios opens its *Jaws* ride, turning an innocent boat tour into a flame-engulfed shark-bait journey.





A young Steven Spielberg
in the mouth of "Bruce."

BY THE NUMBERS

3

number of
mechanical sharks
used in the film

27

Director **Steven Spielberg's**
age

June 20, 1975
the film's
release date

159

the number of **days**
spent on filming

\$10 million
about how much
it **cost to make**
the film

\$470 million
the film's
worldwide gross

SHARK BAIT OOH HA HA MAY 30, 2003

Bruce the great white shark
from *Finding Nemo* reminds us
that "fish are friends, not food."



SHARKNADO JULY 11, 2013

Shamelessly brainless,
Sharknado combined our fear
of tornadoes and sharks.



SHARKTOPUS
SEPT. 25, 2010:
Half shark. Half octo-
pus. Totally ridiculous.



LEFT SHARK TAKES CENTER STAGE FEB. 1, 2015

The infamous "Left Shark"
danced his way into our hearts,
making up for the terrible com-
mercials of Super Bowl XLIX.



1999 2001 2003 2005 2007 2009 2011 2013 2015

SHARK TALE OCT. 1, 2004

"Swimming with
the fishes" gets
a whole new
meaning when
sharks serve as
the underwater
mafia.



MEGA SHARK VS. GIANT OCTOPUS MAY 26, 2009

Two prehistoric sea creatures
battle for control of the underwater
realm. (It's no mystery which one
we were rooting for.)

SHARKNADO 2 JULY 30, 2014

Sharknado 2
is released
— because
one cheap,
empty-headed
thrill just
wasn't enough.



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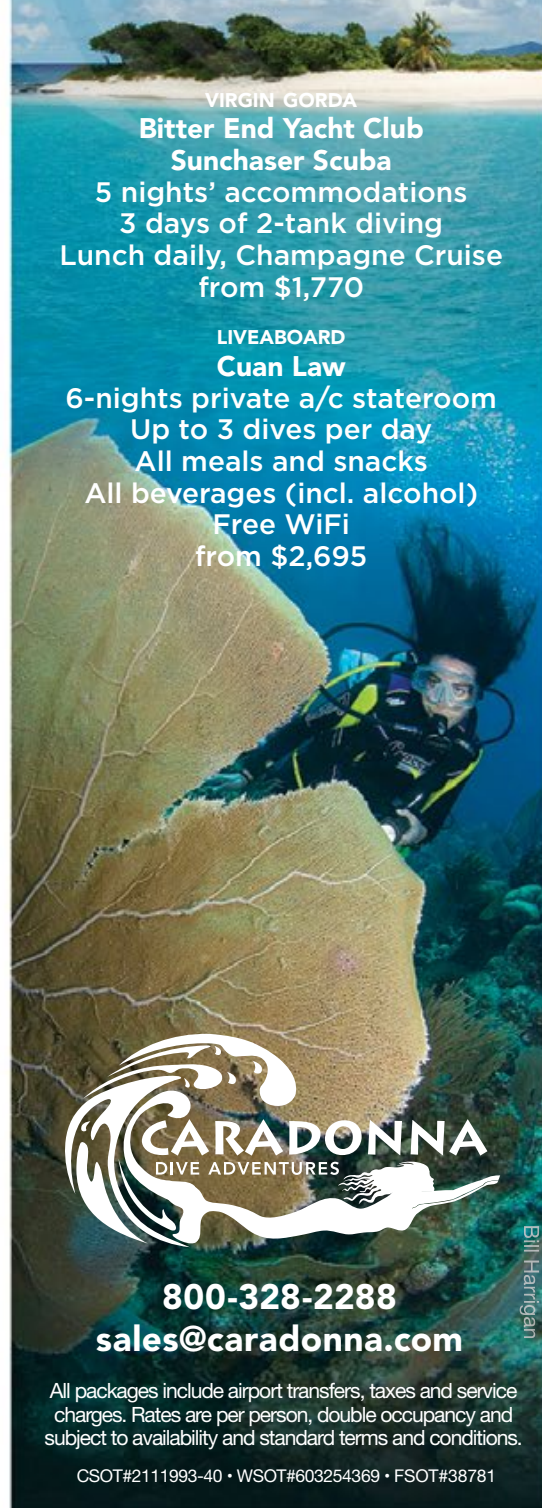
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Bill Harrigan

THE SHARK ISSUE

OUTSIDE THE CAGE



Secret Garden

SIMON'S TOWN,
SOUTH AFRICA

While I was in South Africa chasing sharks, finding a broadnose sevengill was at the top of my wish list. Not only is it an odd-looking shark — its seven gills make it look like it was extracted from prehistoric times — but its kelp forest habitat is also a beautiful underwater environment. As I entered the 55°F water, my guide's words resounded: "You don't have to be on the lookout for them; they will find you." After 30 minutes my tank was empty due to the cold. I spotted only one small, shy individual, and the photos I got were, well, just photos.

As I got out of the water, complaining about the cold, the rest of the divers looked at me with compassion: "At least you tried!" I responded: "I'm not done trying! Do you have another tank?" With that, I was back in business, and it wasn't long before I saw this sevengill that allowed me to get the photo I had in mind. Perseverance always pays off.

PHOTOGRAPHER

Pedro Carrillo

CAMERA GEAR

Nikon D4, Seacam D4 housing, Sigma 15mm F2.8 EX DG fisheye lens, dual Seacam Seaflash 150TTL



NOTHING TO FEAR BUT FEAR ITSELF

SHARK SIGHTING CAUSES DIVER TO FORGET TRAINING **BY ERIC DOUGLAS**



Wendy loved diving. She loved the sights and the lack of noise. She loved the feeling of the warm water and weightlessness. The only thing she didn't love was sharks. Misrepresentations of sharks in the media caused her to think that they were nothing more than mindless killing machines. So far, Wendy hadn't had to face her fear underwater, but then she saw something move on the other side of the reef. Something big.

THE DIVER

Wendy was in her mid-40s and generally healthy. She had a couple of minor issues with her lower back, but nothing that would keep her from diving.

She had been diving for only a few years, but Wendy enjoyed the social and health benefits of the sport. Her one concern was seeing a shark. She couldn't pinpoint exactly why she was afraid of them, but the fear was there, never far from her mind.

LESSONS FOR LIFE

1 ASCEND SLOWLY AND NEVER HOLD YOUR BREATH This is the emergency those diving axioms are intended to avoid. Failure to follow them can lead to serious injury or death.

2 STOP, THINK, BREATHE AND THEN ACT When you are put into a stressful situation, take a moment to think about the best action before reacting on impulse.

3 LEARN ABOUT SHARKS Sharks are wild predators and should never be taken lightly, but most pose little to no threat to divers. Instead of being feared, these beautiful animals should be respected.

THE DIVE

The air was warm and mild, just like the water. Wendy and her buddy, Robert, were making a boat dive in the Caribbean about 40 feet below the surface. Wendy was entranced by the scene: The bright sun dappled the water, giving a kaleidoscopic effect. She had been underwater about 20 minutes, veering away from the boat only to explore nearby reefs and swim-throughs. Swimming slowly through a crack between two coral formations, Wendy caught something out of the corner of her eye that made her stop dead. She wasn't sure what it was — all she saw was the tail. Wendy's heart began beating faster and her breathing quickened, but she was more curious than alarmed. She decided to investigate, glancing behind her to make sure Robert was in sight before slowly moving forward.

THE ACCIDENT

When Wendy didn't see anything, she began to relax. It must have been her imagination, she thought. And then a 6-foot Caribbean reef shark appeared from between the coral heads. It slowly passed by Wendy a few feet below and 20 feet to her right.

The shark didn't react at all, but that didn't matter to Wendy. Her heart rate and breathing immediately escalated. She couldn't catch her breath, and she was suddenly consumed with fear, convinced the shark was circling around behind her. She twisted in the water to find Robert, but he was snapping photos of the shark as it swam by. "What's wrong with him?" she thought frantically. "Doesn't he know we're in danger?" She started spinning in circles trying to see the shark, but her jerky motions and rapid breathing made things worse. In seconds, the only thing Wendy could think of was

getting as far away from the shark as possible. She bolted for the surface.

When Wendy appeared 30 feet from the boat, the crew knew she was in trouble. She was flailing her arms and her mask was off. The divemaster signaled to her, asking if she was OK. When she didn't respond, he grabbed a life ring and dived in to get to her. Wendy wouldn't follow any commands as he approached, and was only semiconscious when he reached her. Just before she slipped back underwater, the divemaster inflated her BC while dropping her weight belt to make her positively buoyant. He quickly towed Wendy back to the boat and initiated emergency procedures. She was put on high-flow oxygen immediately and was evacuated to a hyperbaric chamber. With time, she was able to make a full recovery.

ANALYSIS

According to the Florida Museum of Natural History, there were 218 shark attacks on divers worldwide between 1820 and 2012. Of those attacks, only 19 percent were fatal. In general, sharks are opportunistic predators, feeding on sick or injured fish in the water, so a big, noisy diver is not on the typical shark's menu. The real problem in this situation was Wendy's response to the shark. She let her irrational fear get the best of her, and blocked out her training. She panicked and bolted for the surface instead of calmly and safely making her way back to the boat with her buddy.

Wendy allowed herself to be consumed by fear, failing to exhale on ascent and become positively buoyant at the surface. Her rapid ascent without exhalation caused the air in her lungs to expand, and that expanding air caused an air embolism. The gas bubble tore a hole in her lung tissue and entered her arterial blood supply, then moved to her brain, causing the rapid onset of strokelike symptoms and a loss of consciousness. Her injury was serious; Wendy was lucky to make a full recovery.

» Eric Douglas co-authored the book *Scuba Diving Safety*, and has written a series of adventure novels, children's books, and short stories — all with an ocean and scuba-diving theme. Check out his website at booksbyeric.com.

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CLOCKWISE FROM TOP: GREG LECOEUR; MICHELLE MAKMANN; COURTESY BLACKBEARD-CRUISES.COM; SCOTT JOHNSON



PARTY LIKE A PIRATE

You'll do everything but pillage and plunder on Blackbeard's weeklong Bahamas dive fests

BY MARY FRANCES EMMONS

Instructor Eitan Newman is perched behind *Sea Explorer's* wheel, dressed in what looks like the top half of a Left Shark costume.

"In case you don't see any other sharks," he offers, before beginning his briefing on a highlight of Blackbeard's Bahamas adventures: lunch with the sharks at a site off the foot of Eleuthera called Split Coral Head.

Newman need not have worried. Before we even splash in, one brand-new diver is nervously peering over the side, hollering, "There are sharks down there!"

No kidding. By the time our entire complement of 21 divers is arrayed on the sand beneath our 65-foot sailboat,

eight to 10 Caribbean reef sharks are circling. This ain't their first rodeo — they know what's coming. Like an underwater New Year's ball-drop, a large chumsicle begins its stately descent down the line, guided by a now more-appropriately outfitted Newman. The sharks are beautiful, gliding through clear water and long shafts of sunlight, a serene yet still awe-inspiring scene — that is until one hooks a tooth in the frozen chum, and all heck breaks loose. It's only a momentary frenzy, but it gets everybody's adrenaline up, sharks and humans, before the experience concludes with a free-for-all hunt for shark teeth, the only thing you're allowed to take with you from this pristine underwater realm.

***Morning Star*, top, and *Sea Explorer* are sister sloops. Blackbeard's shark-feed dives are a signature of the experience; for those willing to make the crossing down to Big Major Cay, the swimming pigs are a hoot and a half.**

YO HO, YO HO

Blackbeard's sloops aren't like most liveaboards. The 55-ton sailboats have berths for up to 22 divers and five crew. This is boat camping. *Primitive* boat camping — to say

that quarters are close is to say that the Sistine Chapel has a pretty nice ceiling. But the food is fantastic, plentiful and delicious — it's like Mom came camping too! — and the young crew, while professional and task-oriented, is friendly and fun-loving. The weeklong dive party is great for solo or younger divers, or the young at heart: Our trip included wannabe buccaneers from 12 to 70-something, from grizzled dive vets to families just getting certified.

Blackbeard's slogan is "Twice the fun ... half the cost," and that's literally true: Two luxury liveaboards ply the same sites you will, except those divers are paying more than twice as much to submerge at lovely spots like Monolith, off Eleuthera. Its name-sake is a sweet little pinnacle at 80 feet or so, a perfect Cleopatra's Needle perched at the edge of one of the Bahamas' trademark plunging walls, easy to circle round and round until you've covered every inch. Zigzag back

NEED TO KNOW

WHEN TO GO

The Bahamas is a year-round dive destination; Blackbeard's itineraries are weather-dependent, so you may dive any of dozens of sites off Nassau, the northern Exumas or southern Eleuthera.

DIVE CONDITIONS

Water temps range from 72 to 77°F in January,

when a 5 mm might not be too heavy, to 81 to 85°F July to September, when a bathing suit will suffice.

OPERATOR

Blackbeard's Cruises (blackbeard-cruises.com) operates two 65-foot sloops, *Sea Explorer* and *Morning Star*; each has 18 dorm-style bunks. Weeklong cruises include all meals and beverages (alcoholic and non) and

up to 19 dives per week, fewer if weather permits extras like a run down to Staniel Cay to snorkel the beautiful Thunderball Grotto, featured in the James Bond movie of the same name, or to visit the famous swimming pigs of nearby Big Major Cay.

PRICE TAG

It's \$979 per week per person, not including port fees and crew tip.

up toward an eel garden on the sand — stalking them is good pirate practice — or fin across a coral gulch and watch the wall recede beneath you.

Sunny, relaxing, easy-peasy — that pretty much describes the diving in Exuma Sound and off southern Eleuthera. Intriguing terrain beckons everywhere, from room-size coral heads like Tunnel Rock, pocked with

swim-throughs wide enough for giant loggerhead turtles to join you, to lovely little bommies at Lobster No Lobster, southeast of Nassau, that unfold for your inspection like the petals of a flower. Reefs are cut through with sand channels that sometimes run right off the wall and into the abyss, as at Cut Through City, or lead to secret small caves, as at Madison Avenue.

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Benja Iglesias

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THE YIN AND THE YANG

That's the Blackbeard's twist: low rent, big payoff. You're diving the same sites as those luxe liveaboards, three to four times a day, but you'll be berthed in dorm-style bunks, where you can neither sit up nor perhaps fully stretch out. The food's great, but you'll be balancing your plate on your knees, wherever you can find on deck to perch. (No one said the pirate life was easy.)

But it's more than that. You might feel closer to the sea and sky — and stars — on a sailboat than you ever have, which makes for unforgettable moments, like when someone hollers, "Fish on!" and everybody rushes the stern in time to see a flash of aqua running along the port side.

It's a mahi. Our jubilation is premature — after a brief struggle, the fish slips the line and gets away at the



Blanketed by the bright outer band of the Milky Way and warmed by a beach bonfire and free-flowing rum punch, it doesn't get much better than this.

says first mate Chris Lawrenson.

On another evening we're gifted with the elusive green flash at sunset — just a tiny emerald nugget, but it was there. Forty-five minutes later a glowing orange moon rises over the bow, where divers cluster in small groups, laughing and talking softly, enjoying the rum punch that flows freely once the day's dives are done. A beach bonfire near Cape Eleuthera on our only port night turns into the best party I've

been to in years. And nobody wanted to go home after the final night's bash with the crew at a Nassau bar with an unreal house band — "the best dive of the week," said one graybeard.

A pirate's life indeed.

MICHELLE MAKMANN

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Photo: David Benz ©

Up in the Air

PLAYA DEL CARMEN,
MEXICO

The beauty in this picture is a 6-foot-long female bull shark (that I believe is pregnant) that came to Playa del Carmen for three months. Tourists from all over the world gather here to enjoy the company of sharks and, thanks to their popularity, sharks are getting more protection by the locals and by the government. The seafloor is 90 feet down, and I had to hover at about 60 feet to get this shot, struggling with a heavy current, and waiting patiently for the shark to be next to the stingrays' marks and the rocks, right where I wanted her. The visibility was wonderful that day. The aerial view makes the shark look so small, and I like to think it symbolizes the recent change in humans' mind-set toward these animals. For years sharks have inspired fear, but nowadays, with awareness campaigns and information, that fear has been minimized and is turning into understanding.

PHOTOGRAPHER

Iskander Itriago

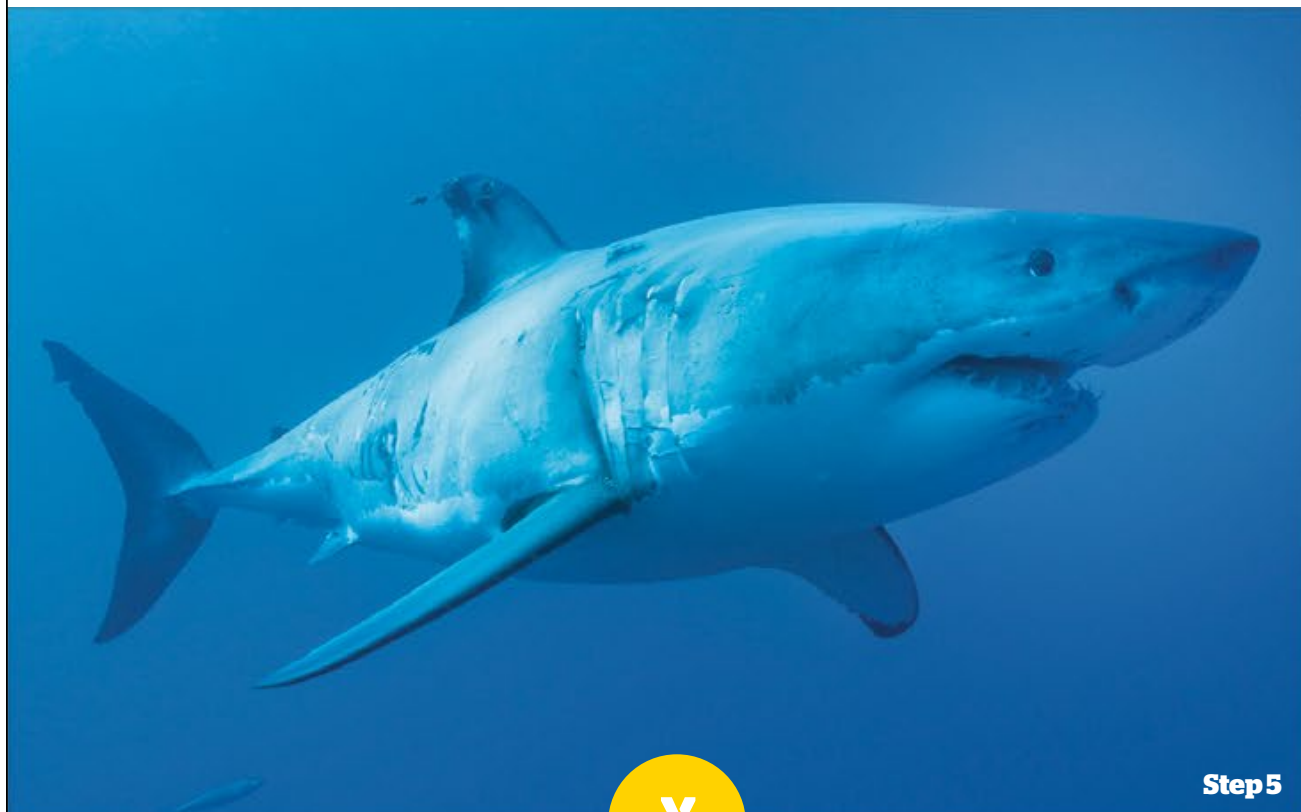
CAMERA GEAR

Nikon D700, Sea&Sea housing, Nikon 16-35mm lens, INON Z240 strobe

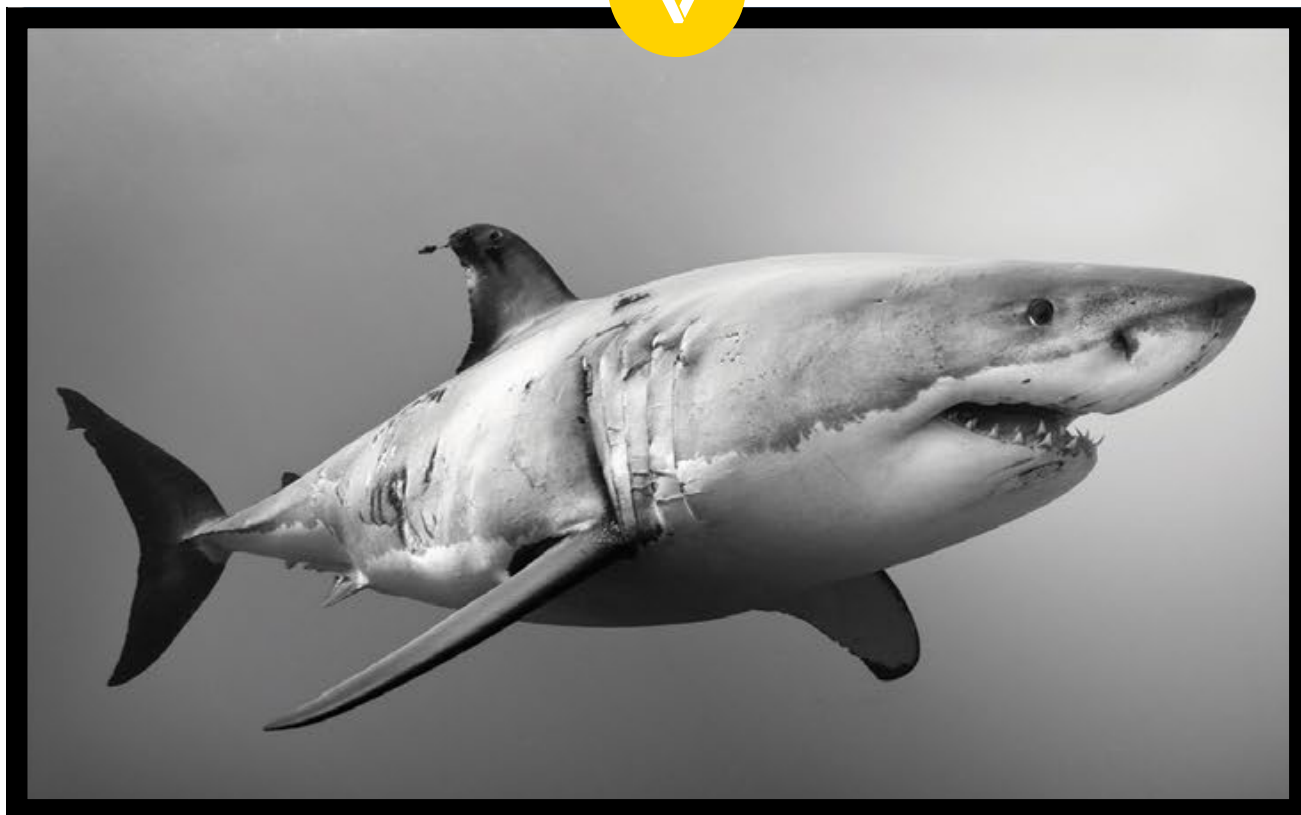


OUTSIDE THE CAGE





Step 5



KEEP YOUR SHARKS SHARP IN POST

TEXT AND PHOTOS BY ERIN QUIGLEY

Sharks are a favorite photo subject of mine, and I've developed a few post-production techniques that help perfect shark images.

1 Desaturate with an Adjustment Brush to remove unwanted color.

» In the Develop module of Lightroom, click on the Adjustment Brush icon. Slide

the Saturation slider to the left to set a high negative value — you'll finesse this later. You won't see anything change until you paint with a brush in the image.

» Brush over areas on the shark where you see a blue-green color cast. If you get sloppy with the brush, holding down Opt (Mac) or Alt (PC) gives you a temporary

eraser to tidy up.

» Move the Saturation slider back toward the right until you get the result you want.

2 Add Clarity with an Adjustment Brush to enhance pattern and emphasize eyes.

Clarity increases midtone contrast, giving the appearance of added sharpness and punch. Too much Clarity added globally in the Basic panel can make your image look overprocessed, so it's better to add it locally using Lightroom's Adjustment Brush and Filters.

» In the Develop module of Lightroom, click on the Adjustment Brush icon. Set a high positive value for Clarity by moving the slider all the way to the right. It doesn't matter if you set it too high — you'll dial it back later. You won't see a change until you paint with the brush in the image.

» Brush over areas that have pattern or texture that you want to emphasize. Locally added Clarity can also work to punch up contrast in light rays. Adjust the slider back down to the level that looks best. You can also add Clarity with the Graduated or Radial filters.

3 Sharpen teeth, not water.

Sharpening is the process of emphasizing edges. When sharpening gets applied to water, or other areas of flat color, it can do more harm than good. Luckily, Lightroom's sharpening controls include a tool that lets you apply sharpening to only areas of critical contrast.

» In the Develop module, open the Detail panel.

» After setting the desired values for Amount, Radius and Detail, zoom out so you can see your whole photo.

Step 1



1. Adjustment Brush 2. Negative Saturation

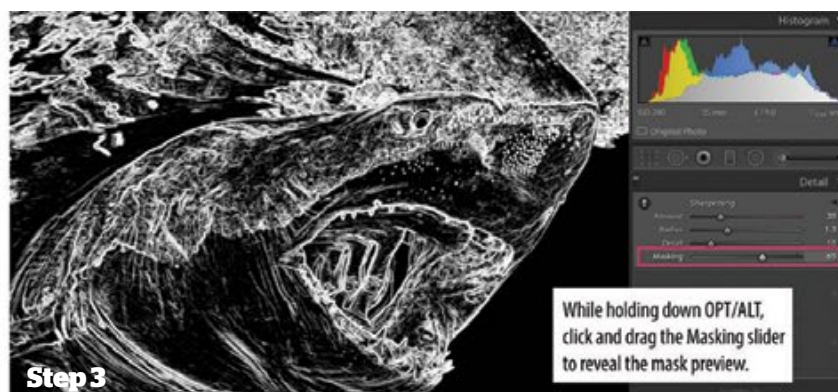
IMAGING

» While holding down Opt (Mac) or Alt (PC), click and drag on the Masking slider. At first you'll see a completely white screen. As you move the slider to the right, some areas become gray, and eventually some areas will be black. Where you see white pixels, 100 percent of the sharpening values set in Amount, Radius and Detail are being applied. Gray pixels indicate a lesser value of sharpening, and black means that there's no sharpening at all.

Stop when you can see all critical detail in white, and flat areas in black.

4 Remove bubbles and bait using Content Aware Fill in Photoshop.

» Open your image in Photoshop. With the Lasso



tool, draw a loose selection around the object you want to remove. Go to Edit>Fill, and choose Content Aware from the drop-down menu. If you have a Color Adaptation checkbox (Photoshop CC), click it on. Hit OK and watch the magic.

» Content Aware doesn't always do a perfect job, but it usually gets you most of the way there. Use Photoshop's healing and cloning tools to clean up any details.

5 Use the Targeted Adjustment tool in Lightroom for black-and-white conversion.

» In the Develop module, select an image and click on the B&W tab near the HSL panel. The B&W Mix panel will open, and you'll see Lightroom's default black-and-white conversion of your image. Although your picture is now black-and-white, the panel sliders correspond to color channels,

which makes the editing process nothing better than a guess if you don't remember which part of your now black-and-white photo used to be a particular color.

» In the upper left corner of the B&W Mix panel is the Targeted Adjustment tool. Click on its icon to activate, and move your cursor into the image. Click and drag up in an area you wish to brighten, and down where you want it darker. It's just that simple. The Targeted Adjustment tool also exists for the Tone Curve, another panel useful for creating dramatic monochromes.

» Erin Quigley is an Adobe ACE-certified digital-imaging consultant and an award-winning shooter. GoAskErin.com provides custom tutorials and one-on-one instruction for the underwater photographic community.

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TO BE A SHARK WEEK VIDEOGRAPHER

BY ANDY BRANDY CASAGRANDE IV, AS TOLD TO BROOKE MORTON

This particular film started with the working title *Sharks of Darkness*. We are in New Zealand, near a seal colony, where we aren't witnessing daytime predation from the great whites we're there to film. But they must feed on seals, so we figure we'll investigate. During the day, we familiarize ourselves with the area. I'm surprised how amped up — how untamed and wild — these sharks are. It's not at all like Isla Guadalupe, Mexico, where the animals know the drill. Here, it's all new. Curious, the great whites use their mouths to explore — which, for filming, is amazing.

Nightfall can't come soon enough. We're ready for the underwater cage, which

IMMEDIATELY A SHARK SWIMS TOWARD MY CAMERA, CRASHING INTO IT. IT'S SO CLOSE, I CAN'T FOCUS OR TRAIN MY LIGHTS ON IT.

differs from usual ones in that its sides have wide openings with no bars, necessary for my 50-pound Epic Red Dragon camera, which requires wide clearance.

Once inside, we're lowered 70 feet into total darkness. I flip on my camera lights and immediately a shark swims toward my camera, crashing into it.

It's so close, I can't focus or train my lights on it. Then

a second and a third come charging in, all forcing their way into the cage at once. I start thinking, *They must be attracted to the light. Or, perhaps because it's night, they're in hunting mode.*

Either way, it's not looking good and I'm not feeling all that comfortable. In darkness, we resemble seals, thanks to black wetsuits, and I'm wondering if this was a good idea. *How am I going to reach the surface?* When I work in a cage, I don't wear fins. They're strapped to the side, where, right now, a shark is chomping on aluminum.

At least half a dozen white sharks surround the cage, and a couple are still pushing their way inside. I can't help but picture one stuck in between the bars. It would only turn more aggressive. Violent.

I can't slow my racing heartbeat. I look at my gauges. I'm almost out of air. I've never been so freaked out inside a cage, let alone outside.

It's time. I remember the communication system linking me to the surface, and I yell to the director to hoist us out of here.

That was easily the most afraid I've ever been. Apparently, viewers felt the same way, and they liked it. The show, renamed *Lair of the Mega Shark*, rated so well that we just filmed a part two.

GREAT WHITE

The great white shark (*Carcharodon carcharias*) can be identified by its large size and distinct coloration — dark on top with a white belly. Despite being one of the most famous shark species, little is known about their reproduction. They are listed on the IUCN Red List as Vulnerable.

TERRITORY

Hot spots for this species can be found in California, South Africa, Australia, Mexico's Isla Guadalupe, and recently, they may be returning to Cape Cod in the U.S. They migrate thousands of miles; one female swam more than 6,000 miles.

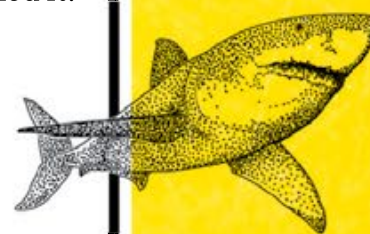


BEHAVIOR

Great whites feed on squid, fish, other sharks and seals, and also scavenge on larger dead animals, such as whales. This shark can reach speeds of 31 miles per hour.

SIZE

They can reach about 20 feet in length and weigh up to 2 tons.



Beauty & the Feast

CHRISTMAS ISLAND,
AUSTRALIA

I traveled to Christmas Island to witness the famous red crab migration, but I was also hoping for some pelagic action in the pristine reef. Every year the red crab spawning attracts whale sharks and manta rays to the shore to feed.

Our surface intervals were spent looking for pelagic action, specifically bird activity that would point us toward baitballs and, hopefully, a feeding frenzy.

This day will always stay in my memory as the best 20 minutes I've spent in the water in almost 20 years of diving. One really big whale shark was feeding with its head up in the water, totally undisturbed by our presence, surrounded by silky sharks and small tuna. It was an adrenaline rush, with tuna and sharks coming from everywhere, crystal-clear water and just the five of us in the water. It was a perfect experience.

PHOTOGRAPHER

Pedro Carrillo

CAMERA GEAR

Nikon D4, Seacam D4 housing, Nikkor 16-35mm f/4 VR lens



Setting the Record Straight

BBC DOCUMENTARY DISPELS SHARKS' BAD-BOY REP BY PATRICIA WUEST

Steve Greenwood, of Bristol, U.K., produced the three-part series *Shark*. He says it's time to stop regarding sharks as cold-blooded man-eaters.

Q: WHY THIS PROJECT?

A: After I started diving, I realized there was this whole world to explore. I was hooked on the extraordinary diversity of life. Sharks are the coolest animals on the planet, and I wanted to change people's preconceptions. The first film is about the diversity of sharks and their hunting behavior. The second looks at all aspects of their lives other than hunting. The third looks at the discoveries being made by scientists and the threats facing sharks.

Q: WHAT SURPRISED YOU MOST DURING FILMING?

A: Where do I start? Some sharks glow in the dark. Some sharks have belly buttons. Shark courtship, the amazing diversity of shark eggs, and there's even a shark that can walk on land — the epaulette shark on the Great Barrier Reef — that's only 2 feet long. I could go on for a long time!

Q: WHAT OTHER SPECIES DID YOU FILM?

A: In all, 30 species of sharks and rays were filmed in dozens of locations. To name just a few: hammerheads, oceanic whitetips, reef whitetips hunting at night, Port Jacksons, lemons and many, many more.

Q: HOW LONG DID IT TAKE?

A: It took us two and a half years, and the team spent 3,000 hours filming underwater.

Q: WHAT DO YOU WANT VIEWERS TO TAKE AWAY?

A: I hope people will appreciate that these are complex, intelligent and sophisticated creatures that are surprisingly vulnerable. I want to rebrand them.



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SO YOU'RE THINKING ABOUT A SHARK DIVE

5 TIPS TO HELP DECIDE IF YOU ARE READY

BY TRAVIS MARSHALL



Shark encounters are some of the most sought-after adventures among scuba divers, but not every diver is fully prepared to go face to face in a feeding frenzy. Are you?

1 EDUCATE YOURSELF

Sharks are curious creatures, not the mindless man-eaters depicted on TV. The more you learn about them before your dive the better. A specialty course like PADI's Project AWARE Shark Conservation course is a good first step.

2 STAY COOL As the sharks start to gather, the safest place for divers is on the bottom. Panic attacks or emergency ascents can make sharks see you as something other than a passive observer. So it's important to feel calm and comfortable in the water.

3 BECOME A BUOYANCY MASTER

Once you jump in, you'll need to make a timely descent to the bottom, and you need to have the buoyancy control to sit firmly on the seafloor and swim efficiently

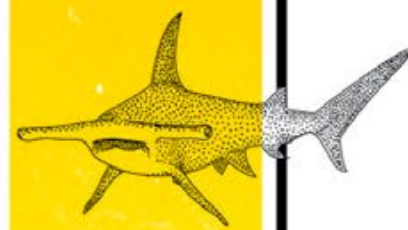
without floating up into the feeding zone.

4 KEEP YOUR HANDS TO YOURSELF

Sharks do take exploratory bites of things that look like food. While they rarely bite divers intentionally, an outstretched hand is easily confused with a fish. So keep your hands close to your body at all times.

5 BE PREPARED TO CALL THE DIVE

Usually sharks seem mildly curious about divers, at most. But sharks are wild animals, and they can be unpredictable. Pay attention to your dive leader's instructions, and know that he may call the dive or order you out of the water at a moment's notice. And if it happens, move quickly and don't ask questions until everyone is safely back on the boat.



GREAT HAMMERHEAD

The great hammerhead shark (*Sphyrna mokarran*) is particularly vulnerable to being hooked, caught and handled by fishermen, and may not survive even if released. They are one of the 14 species most frequently found in Hong Kong markets and are listed on the IUCN Red List as Endangered. They reproduce once every two years.

TERRITORY

They can be found in tropical waters, both inshore and offshore; they are considered nomadic, with long migrations.

BEHAVIOR

Great hammerheads are known to feed on stingrays, using the sensory system on the underside of their "hammer" to detect their prey in the sand, pinning the ray to the seafloor, and then manipulating it into their mouth. Most hammerheads keep their distance from divers in non-baited situations.

SIZE

This species of hammerhead can grow to be anywhere between 13 and 20 feet.

> sharksavers.org

GIACOMO PALAVICINI

OCCUPATION
DIRECTOR,
ROATAN MARINE
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In 2010, director of the Roatan Marine Park Giacomo Palavicini was instrumental in demonstrating the value of shark tourism in Honduras, and in persuading its government to declare a shark-fishing moratorium. For that he is our July 2015 Sea Hero.

HOW DID THE BAN COME ABOUT?

I started working with shark-dive operators and got rough estimates of the value of each shark per year as a tourism attraction: around US\$47,000. We went to the fishing authorities and other government agencies and suggested that if they made an effort to protect these animals, they would not only ensure a good steady income from tourism, but they also would improve the perception of Honduras overall. Just a week after we met, the government confiscated a big cargo of sharks

— mostly hammerheads, all juveniles — and this made them decide to close the fisheries in February 2010 and declare a shark sanctuary in June 2011.

WHAT IS THE BIGGEST CHALLENGE FOR THE RMP?

There is a huge gap between the government and our communities. We have worked hard to help communities feel empowered and to understand that it's in their best interest to take care of their resources.

HOW CAN DIVERS HELP?

We all have the power to say no. Do research when you go to a restaurant, dive operation or a destination — if they are not environmentally responsible, say no and find some other place. Businesses can see when their income is being affected by their bad practices.

Each Sea Hero receives an Oris Aquis Date watch valued at \$1,595. At the end of the year, a panel of judges selects a Sea Hero of the Year, who receives a \$5,000 cash award from Oris to further his or her work. Go to scubadiving.com/seaheroes to nominate a Sea Hero today.



People of action, devoted to protecting the planet's oceans and marine life through conservation, technology or by simply helping others. If you spot a Sea Hero, join *Scuba Diving*, Oris and the 2015 Sea Heroes program by nominating him or her at scubadiving.com/seaheroes

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THE SHARK ISSUE

OUTSIDE THE CAGE





Curves Ahead

BIMINI, BAHAMAS

During the migration of great hammerheads in Bimini, I was on the sailboat *No Stress* with a small group of divers for a liveboard trip diving in the Bahamas.

Attracted by the smell of a fresh fish, this 13-foot great hammerhead nervously came to investigate the divers.

This shark is guided by instinct, and its behavior can be unpredictable. When you dive with this predator, you can feel how powerful an animal it is. Watching this shy and rare animal is exceptional, its hypnotic swimming amplified by the sun on the sand.

But when this female came too close, it was very exciting — she made a 180-degree rotation with amazing flexibility. The action was so rapid and unpredictable that I am very happy to have immortalized the moment!

PHOTOGRAPHER

Greg Lecoeur

CAMERA GEAR

Nikon D7000, Nauticam housing with mini dome, Tokina 10-17mm lens, dual Ikelite DS160 strobes



Becoming a Shark Conservationist

SOMETIMES THE BATTLE TO SAVE SHARKS GETS UGLY

BY SHAWN HEINRICH

Fighting for shark conservation is often frustrating and discouraging. With more than a decade of investigative experience, I have seen just about every imaginable act of cruelty and wanton destruction. I have gone undercover in some of the most remote locations in the world: Taiwan, Indonesia, Ecuador, Peru, Costa Rica, Fiji and Africa. My objective is to combine powerful stories with images, exposing the truth.

One chilling experience occurred in 2010 in Manta, the shark-fishing hub of Ecuador. I was on assignment to document large-scale landings of shark species. With its tuna stocks severely depleted, the local fishing community

had turned to targeting sharks.

When I entered the town, the tension weighed heavily. What followed next were perhaps the most intense 24 hours of my life. In the first hour, I had to fend off teenage bandits using only my monopod. Dinner ended abruptly when the restaurant owner informed my group that intoxicated fishermen were about to storm in and assault us. We slipped quietly out the back door.

Wielding bloodstained machetes, fishermen hacked the fins off the bodies of sharks piled on the beach. Twice a razor-sharp machete was pressed against my jugular, as angry fishermen cursed me and threatened to cut my

throat. Each time I defused the situation with a smile, proclaiming myself a *pes-cador de tiburones* (shark fisherman). As the last sharks were processed, our fixer grabbed me and said, "The fishermen say as soon as they are done chopping the sharks, they are coming for you." It was time go.

Our photos were the "smoking gun" images circulated globally by the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Almost overnight, sharks became a priority on the CITES agenda. Finally, at the 2013 CITES meeting, historic protections for many species of sharks (and rays) were achieved.



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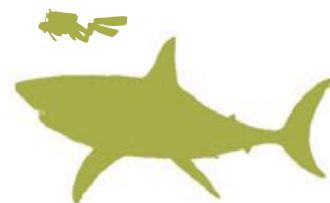
Ancient History

Based on prehistoric fossil records, we know that sharks have been around for hundreds of millions of years. Here are some interesting distant relatives of our modern-day sharks, including the ancient and extinct Megalodon — one of the biggest and strongest predators to ever swim the oceans.

HELICOPRION BESSONOVII

Pictured at left, this shark's teeth were arranged in a "tooth whorl," similar to a modern-day circular saw.

CARCHARODON MEGALODON



The massive *Carcharodon megalodon* ruled the ocean more than 10 million years ago and has similar characteristics to the modern-day great white. With lengths of up to 59 feet and teeth more than 7 inches long, the

school-bus-size shark makes a great white look like a Smart car.

EDESTUS PROTOPIRATA

Also known as the "scissor-toothed shark," *Edestus* had a curved row of teeth that looked like monstrous pinking shears.

STETHACANTHUS PRODUCTUS

This small shark is best known for its anvil-shaped dorsal fin and crest.

TRIODUS SESSELENSIS

A small, freshwater shark that resembled a modern-day conger eel, it went extinct 202 million years ago.

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Into the Blue

ISLA GUADALUPE, MEXICO

This image was taken in 2012 in Isla Guadalupe. We were diving outside the cage with great whites, and yet my biggest challenge was completing my composition wish list. Every time I go into the field I have a vision of what I want, and a diver below a great white was at the top of my list. This shot might look like

it was easy to capture, but that's not the case at all. It took me 25 hours out of the cage to achieve this moment. I had only a single opportunity to capture this shot throughout the whole expedition.

To keep the sharks from getting too excited, we didn't use bait while we were in the water, but we did light chumming beforehand to attract them. I think this image has the super power to show the world that great white sharks are not man-eaters.

PHOTOGRAPHER

Daniel Botelho

CAMERA GEAR

Nikon D4, Nauticam housing with Zen 10-inch dome port, Nikkor 14mm lens, Ultralight arms and dual Sea&Sea YS-250PRO strobes





WILDAID'S SHARK SAVERS

IN SEARCH OF A WORTHY CAUSE? HERE'S HOW YOU CAN HELP.

MISSION Saving the world's shark populations by building awareness, education and action

HQ San Francisco **YEAR FOUNDED** 2007; merged with WildAid in 2014 **CONTACT** wildaid.org

PROJECT Shark Savers works to reduce the demand for shark fins and to increase the scope and regulation of shark sanctuaries worldwide. "Sharks play a critical role in marine ecosystems as the top predators that keep populations of other species in balance," says Marcel Bigue, WildAid's marine program director. "The health of our oceans depends on them."

1 SAY NO TO FINS

Shark finning kills roughly 73 million sharks each year and is rapidly driving many species toward extinction, but you can help stop that. Join Shark Savers' movement, I'm FINished with FINs, by signing an online pledge to not consume shark fin under any circumstances. But don't let your involvement end with a signature: Talk to legislators about banning the practice, and locate restaurants in your community that have shark on the menu. Sparking conversation is the first step in fighting the problem.

2 DIVE FOR SCIENCE

Even if biology wasn't exactly your best subject in school — we're not judging — Shark Savers wants you to join the front lines with its SharksCount program. Divers of all skill levels are given tools to count and identify the sharks they see underwater. The data collected is added to an online database to help provide essential information about local shark-population trends, and your dives help promote sustainable shark eco-tourism. Email sharkscount@sharksavers.org and specify where you dive most often.

3 HELP SANCTUARIES

The Shark Sanctuary Program supports local initiatives to protect sharks around the globe. "Marine protection areas, particularly those in the developing world, are dependent upon the support and expertise of groups like WildAid to safeguard their natural treasures," says Bigue. Donate at wildaid.org, and contribute to expanding and safeguarding these areas. You can also increase awareness of the importance of marine sanctuaries in your community by using educational resources available on Shark Saver's site.

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photo by: Wally Diehl/Blue Ocean Ink

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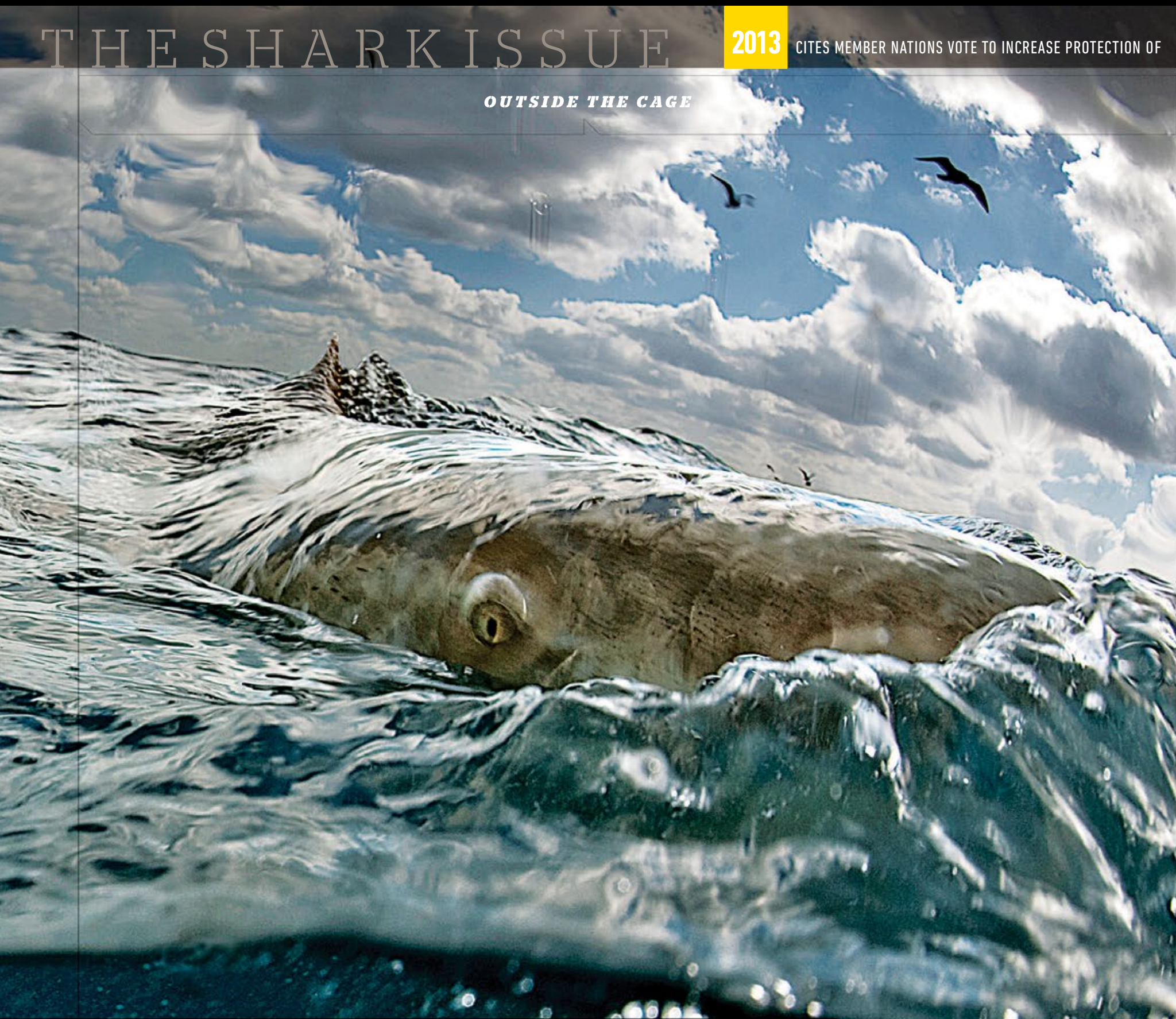
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OUTSIDE THE CAGE



Eye Spy

TIGER BEACH, BAHAMAS

This image was taken in 2012 at Tiger Beach and is one of my most famous photos. It has been exhibited at the United Nations in New York and at the Fort Lauderdale art museum, but it has never been published in a magazine. The day I took this image was very stormy; after several days not getting into the water because of bad

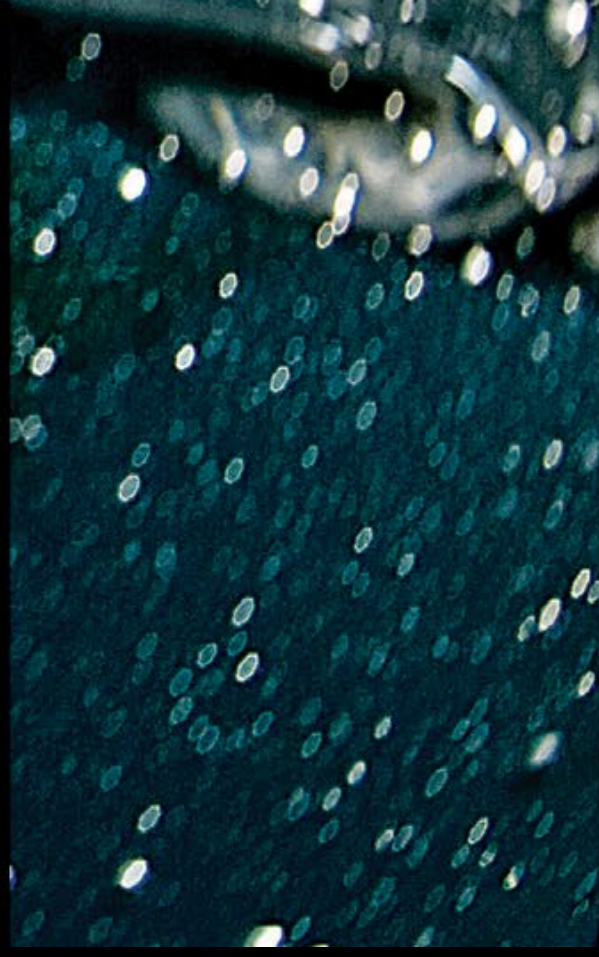
conditions, we decided to snorkel and make split shots; even so, the visibility and the weather were awful. For this photo I had the luck to have a lemon shark stick its head out of the water, more due to the waves than any intention by the shark. The stormy sky, the bad viz and the big waves were a challenge to achieving good images, but I decided to take advantage of the situation, adding a dark atmosphere to the photo. People often say that this shot really brings out how Jurassic sharks really are.

PHOTOGRAPHER

Daniel Botelho

CAMERA GEAR

Nikon D3, Nikkor 16mm, Subal housing, Subal 8-inch dome port, Ultralight arms, dual Sea&Sea YS-250PRO strobes



HOW TO PLAY NICE

FIVE TIPS FROM A PROFESSIONAL SHARK WRANGLER

BY ERIC MICHAEL



People think we're crazy. When the subject of diving with sharks — and the pure, unfettered joy of it — creeps into conversation with the uninitiated, looks of terror, disgust or disbelief typically follow. Despite your most detailed and rational explanation, it's often impossible to convince the naive, media-hype believers that it's positively awesome to share the water with these exquisite creatures. The simple fact is those people don't know what they're missing.

Shark dives are some of the most coveted experiences in the underwater world. And dive destinations, operators and sites around the world that offer consistent close encounters are among the scuba tribe's most popular. From Florida to North Carolina, Rhode Island, the Bahamas, Isla Mujeres, South Africa, Fiji, Cocos Island, Fakarava, Isla Guadalupe, the Galapagos and beyond, if there are heaps of sharks in the water, you'll

find divers doing their best to get close. But what are the best practices for getting close to these often skittish and bashful animals?

To discover the secrets of a true shark whisperer, I asked UNEXSO's Cristina Zenato (unexso.com), a cave explorer, master instructor and educator in Grand Bahama who has been hand feeding and hypnotizing sharks (through tonic immobility) for more than 20 years.

"My babies — the Caribbean reef sharks — are always on the top of my list," says the Women Divers Hall of Famer of her favorite species. "But I am fascinated by many different species, including the goblin shark and the sevengill, and I have a special place in my heart for the blue shark."

Here are five things she says to consider before your next encounter.

LEVERAGE LOCAL KNOWLEDGE

Before any dive that involves large numbers or large species of sharks — whether it's fed, baited or otherwise — Zenato recommends relying on the instructions of the local dive pros rather than basing your plan on what you think you know. "What is an acceptable procedure for one species of shark might be totally inappropriate with another," she explains. "It's important to rely on the understanding and knowledge of the professionals who work with the animals on a regular basis."

BE SELECTIVE WITH OPERATORS

Many of the world's best shark dives are orchestrated by commercial operators. But before committing



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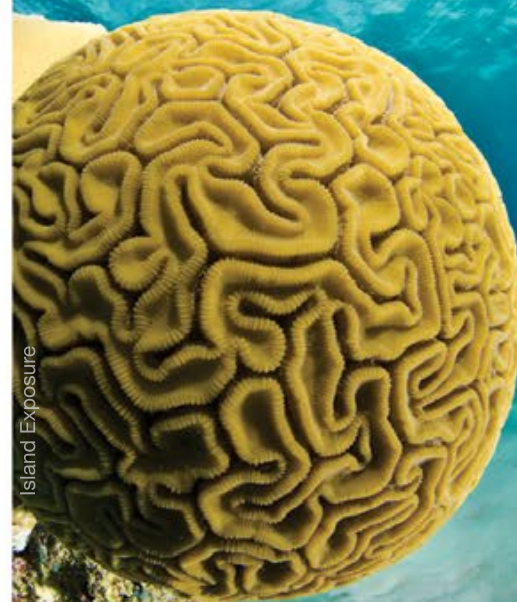
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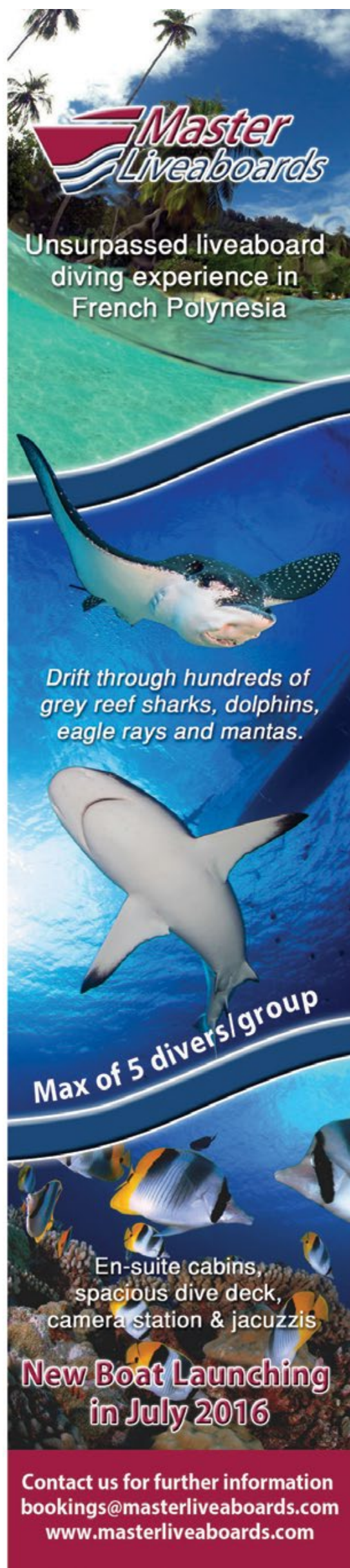
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your safety and dive dollars, it pays to ask the right questions. "In general I would ask how long they've been established and do they have a good safety record," says Zenato. "Do they have a standard description of what they're going to do or their rules? And how do they answer your questions and address your concerns?"

DRESS FOR SUCCESS

Most shark-dive operators have specific rules for equipment. Most require full wetsuits and sometimes even black gloves and hoods for protection. According to Zenato: "This is not the place to test a new wetsuit, camera, BC or other equipment. Dive with gear you are comfortable and familiar with so you can enjoy the time with the animals and not worry about anything else." And about what you've heard about sharks being attracted to colors, especially yellow or pink? "They are attracted by contrast more than colors," she says. "If you're in a full yellow wetsuit, they're not going to be attracted to that. But if you're wearing a black wetsuit without black gloves, your white hands will have enough contrast to attract inquisitive attention."

PRACTICE GLOBAL AWARENESS

Because sharks are such dynamic swimmers, diving with them is a

3-D experience. Strong situational awareness is essential to ensure your safety and enjoyment. "You have to be aware of everything around you — the sharks, the boat, the current, the other divers, where you're drifting," Zenato says. "Pay close attention to instructions, and be ready when it's time to get out of the water. Furthermore, if you're a photographer, take your eye away from the viewfinder every once in a while and just look at the whole scene."

BE AWARE OF BODY LANGUAGE

If you're lucky (or savvy) enough to encounter sharks in an open-water environment, be mindful of physical cues that can translate their mood or intentions. "There's a huge difference between an animal that has never been exposed to divers and one that is used to baited dives," Zenato explains. "A wild animal that is not used to this kind of repetitive interaction will have a more natural display. Quick movements such as sudden changes of direction, rapid dropping of the pectoral fins or any other fast action indicates an uncomfortable animal. Also, when the inquisitive nature of some sharks — for example, blue sharks and oceanic whitetips — intrudes on your personal space, it might be time to get out of the water."

GEAR SOLUTIONS



« SEAC BODY FIT 1.5 CAMO WETSUIT

If you want to experience Cristina Zenato's famed shark dive at UNEXSO in Grand Bahama, you'll have to wear a full wetsuit. Seac's blue/green camouflage won't distract the sharks from the bait she's handing out. Plus its 1.5 mm neoprene is thin enough for use in tropical waters but still offers protection. **MSRP \$199**
INFO seacusa.com



« XS SCUBA TURTLE FIN

Sharks are attracted to contrast more than colors, so opt for a black fin like XS Scuba's Turtle. It might look old-fashioned, but the Turtle has great performance, especially when it comes to acceleration, which will come in handy if you find yourself in a sketchy situation. **MSRP \$210** with spring strap as shown; \$140 with rubber strap
INFO xsscuba.com

TO RESCUE A DUSKY SHARK

BY AMANDA COTTON



Leading a recent shark expedition at Cat Island in the Bahamas, I experienced one of the most extraordinary days in the ocean I've ever had.

Diving with silkies and oceanic whitetips, we were horrified to see a large male dusky shark arrive near the boat with a very deep wound around its head. We could see a large rope — presumably discarded fishing gear — tightly wrapped around its neck just behind the gills; one of its pectoral fins was pinned. The shark was incredibly skinny, with a disproportionately huge head on its emaciated body.

Everyone agreed we had to do something. This shark was dying a slow death. But it refused to come in close to the divers.

To our delight, the shark became more comfortable with us as the days progressed — the decision was made that we would attempt to cut off the rope.

Due to safety concerns, we asked our group of divers if they were willing to give up some in-water time so Epic Diving owners Vincent and Debra Canabal and I could attempt this rescue. The group agreed without hesitation and encouraged us to try.

Armed with surgical scissors and cameras, the three of us made our way into the water and were almost immediately greeted by the dusky shark, whom we later named Atlas. As it approached Vincent and me, Vincent was able to quickly cut the rope and pull it off Atlas as it rolled, allowing Debra to take photos of the experience. As this happened, the group on the boat erupted in cheers. It was truly a group effort to save this shark, and we were all thrilled to see it swim off, free of the rope.

In the weeks that followed, Atlas returned to Epic Diving's boat again and again, showing signs of healing and improvement at an astonishing rate.



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SCUBALAB

PART 1: REGS UNDER \$500

BREATHING FREE

ScubaLab tested six new regs that – while not exactly free – are at least on the friendlier end of the price range; our in-water and ANSTI machine tests found lots to like beyond the price tags **BY ROGER ROY PHOTOGRAPHY BY ZACH STOVALL**

WHAT YOU GET FOR THE PRICE

Regs in this price range tend to be short on frills. None we tested in this price category had breathing resistance adjustments, rotating first stages, swivel hose connections, titanium goodies, etc. In some cases, that means you're giving up a bit of comfort or convenience, such as the additional options for hose routing that you get with a rotating first stage, or the ability to precisely fine-tune your reg's breathing resistance at a particular depth and workload. But that's not to say these regs cut corners when it comes to performance — in our testing some showed work-of-breathing scores on the ANSTI machine and comfort and ease of breathing in the ergo tests to rival regs with much heftier price tags. Of course, their lack of breathing resistance adjustments means it's especially important that their factory presets strike the right compromise between too much and too little at varying depths and breathing rates. Our testing suggests they usually hit very close to the mark.

“Dry and easy breathing — a real pleasure to use.”

— TESTER



REGS, PART 2

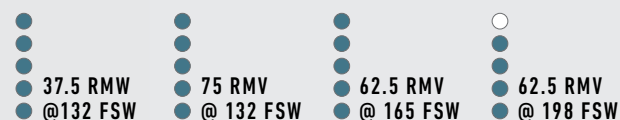
This year ScubaLab had a bumper crop of new regs to test. So we decided to split the harvest, dividing our test models by price and presenting the less-expensive regs in this issue. In our August issue we'll publish test results for our next batch: regs over \$500.

AQUA LUNG
CORE/CORE SUPREME

PRICE \$460 (Supreme \$490) CONTACT aqualung.com
DIAPHRAGM first stage

Aqua Lung's new midrange reg is available in two versions, the regular and the Supreme, which is rated for use in water 50 degrees below zero and comes with an environmentally sealed first stage. Otherwise the two versions appeared identical to us (in ANSTI machine testing they recorded the same intermediate static pressures down to 1/10 of a psi). Like the other regs in this price range, the Cores' only user control is a Venturi lever, which divers found well positioned and easy to grip with or without gloves, and rated good for blocking free-flows (although some divers would have preferred the "MIN" and "MAX" markings on the rounded portion of the lever to be located on the top of the second stage, where they would be more visible). In ergonomic tests the Cores racked up top scores, and were also at the top of the pack in ANSTI machine testing, where they were the only regs in this price category to be rated excellent throughout the range-of-breathing rates and depths. The Aqua Lung Core/Core Supreme regs are our Testers Choice.

BREATHING SIMULATOR RESULTS



HOW WE SCORE

○ ANSTI breathing simulator results shown here are based on a score of 1 to 5, where 5 represents excellent performance with work-of-breathing measurements of 1 joule per liter or less at carefully regulated depths and breathing rates and volumes. See How We Test on the next page for more details.

HOW WE TEST

ScubaLab put these regs through two tests — the first is conducted on a breathing simulator, and the second by our team of test divers.

OBJECTIVE TESTING

We conducted tests on an ANSTI wet breathing simulator at Dive Lab, a commercial test facility in Panama City Beach, Florida. The simulator measures the effort (work of breathing) required to move air through a regulator as it is subjected, underwater, to a precise series of depths and breathing rates.

The simulator pressurizes the test chamber to simulate

62.5 RMV @ 165 fsw:

This represents the European conformance standard EN250, and is also the depth and breathing rate commonly used by manufacturers when determining a regulator's performance.

62.5 RMV @ 198 fsw:

This is the U.S. Navy's Class A test depth and breathing rate (although the Navy uses a higher HP supply pressure than we do).

The simulator moni-

tor sheets. Divers evaluated each regulator in 13 specific performance areas, assigning scores from 5 (excellent) to 1 (poor), and recording their observations and comments about factors that determine the comfort and performance of the reg while they were actually being used.

ERGO TEST CATEGORIES

- 1 Ease of breathing in swimming position
- 2 Ease of breathing in head-up position
- 3 Ease of breathing in head-down position
- 4 Wetness in normal swimming position
- 5 Wetness in head-down and odd positions
- 6 Bubble interference in normal swimming position
- 7 Bubble interference in vertical/stationary position
- 8 Ease of clearing regulator using the blowing method
- 9 Ease of clearing regulator using the purge button
- 10 Purge button stiffness and comfort
- 11 Comfort of mouthpiece
- 12 Venturi lever adjustment function and effectiveness
- 13 Breathing-adjustment-knob function and effectiveness



depths of 132 fsw, 165 fsw and 198 fsw. Each "breath" by the machine moves 2.5 liters of air through the regulator, at breathing rates of 15, 25 and 30 breaths a minute. These precisely measured volumes of air — 2.5 liters multiplied by the breathing rate — are called Respiratory Minute Volumes (RMVs).

37.5 RMV @ 132 fsw:

This represents the maximum recreational depth at a somewhat aggressive breathing rate.

75 RMV @ 132 fsw:

This simulates the potential demand at maximum recreational depth for a diver at an extremely heavy work rate, or loosely simulates two divers buddy breathing at a somewhat aggressive rate.

tors how much effort is required to breathe, measuring the work of breathing in joules per liter (j/l). In our ratings, a score of 1 = 3 j/l or greater; 2 = 2.26-3.0 j/l; 3 = 1.51-2.25 j/l; 4 = 1.1-1.50 j/l; and 5 = 1 j/l or less.

We don't test on the simulator for a pass/fail grade, but to objectively gauge performance in carefully controlled conditions. You can see how each reg performed on the breathing simulator in the charts that accompany the reviews.

ERGONOMIC TESTING

We conducted these tests at Alexander Springs in Florida with a team of divers who recorded their scores during their dives using underwater slates and waterproof

DIVE DEEPER

To see complete test scores, go to scubadiving.com/regs-under-500.

“Best thing is the feather-weight second stage.”
— TESTER



CRESSI

XS COMPACT PRO MC-SC

PRICE \$369.95 CONTACT cressiusa.com

DIAPHRAGM first stage

The XS Compact was one of our divers' favorites in last year's ergo test, thanks to its really tiny, lightweight second stage, which was easy on the jaw. The Compact's latest version maintains the trim profile of the second stage but pairs it with an environmentally sealed MC9-SC (for "sealed chamber") first stage rated for cold-water use. Otherwise the latest version has all the attributes that we liked last year: a large, soft, easy-touch purge cover, and a Venturi switch that's well marked and located on the top of the mouthpiece, where it's easy to reach and operate. Divers rated the reg very good for ease of breathing in a swimming position, for dry breathing in normal positions and for ease of clearing (though some divers found it a bit wetter when head-down). On the ANSTI machine, the XS Compact's performance was rated very good at max recreational depth and good down to our test limits.

BREATHING SIMULATOR RESULTS



ROGER ROY



“
Very
effective
Venturi
settings.”
– TESTER



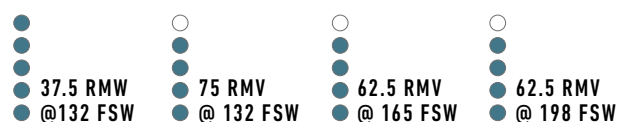
“
A solid
performer
– no weak-
nesses
during
my test.”
– TESTER

TUSA RS790

PRICE \$479 CONTACT tusa.com
DIAPHRAGM first stage

The RS790 has a sealed first stage rated for cold-water use in which two of the four low-pressure ports (marked by “HFP”) are designed to deliver up to a 15 percent increase in airflow. In ANSTI machine testing the RS790 demonstrated excellent performance at a normal breathing rate at recreational depth, and very good performance to the limits of our test depths and breathing rates (and also reached one of the greatest depths of any reg in this category without breaking test parameters, even at an extremely high breathing rate). The second stage is light enough to be quite comfortable in the mouth. The purge cover is soft and large enough that it’s easy to reach and operate, but several divers found it a bit too strong, requiring a careful touch to avoid an unwanted blast of air. While there’s only about 1/8 of a turn in the Venturi lever, the settings proved just right, with surface free-flows curtailed and easy breathing at depth.

BREATHING SIMULATOR RESULTS

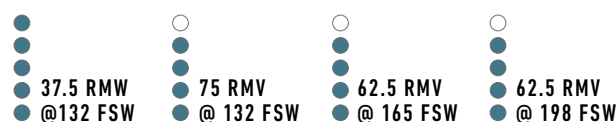


SCUBAPRO MK2EVO/R195

PRICE \$349 CONTACT scubapro.com
PISTON first stage

Scubapro introduced the MK2 first stage back in 1963, and since then (with many updates) it’s earned a reputation for smooth performance and the reliability of an anvil. In its latest EVO incarnation, a smaller body houses a larger piston for more-sensitive response, and it’s rated for cold water. The second stage is also a venerable design, being the latest version of what began as the R190 more than 20 years ago. But nothing about this reg’s performance is old-fashioned. In ANSTI tests it was rated excellent at recreational depth, and very good throughout the range of depths and breathing rates. Test divers were impressed with its easy breathing. “Smooth as silk” and “no effort required” noted test divers. Some divers found the purge too zealous, and we didn’t like the way the first stage’s single high-pressure port limits hose-routing options. But for the price, this reg offers admirable performance, making the MK2 EVO/R195 our Best Buy.

BREATHING SIMULATOR RESULTS



BONUS TEST



Scubapro Air 2 \$239

scubapro.com
Combo inflator/octo regs are stepping up their performance alongside traditional regs. The latest Air 2, now in its fifth generation, is a good example. It has refined ergonomics (including an easy-to-find purge) and an effective dive/predive control. Curious about its performance, we put it on the ANSTI machine, where it recorded a work-of-breathing score at 132 feet, which earned a rating of very good on our scale.

Our divers liked regs with a light-weight second stage, an easy, predictable purge, controls that are effective and easy to adjust, and smooth, steady breathing without a lot of noise. – Roger

Roy, ScubaLab Director





Reg Cleaning

Don't just give your reg a quick rinse after diving — give it a good long soak, especially if you've done multiple dives in salt water. Always be sure to give clean, fresh water time to wash away any salt



that has accumulated before it can cause corrosion or other damage to sensitive parts such as valves and diaphragms. If possible, soak your reg while it's installed on a tank and pressurized, which will prevent water from getting inside. If it's not pressurized, don't press the purge while it's soaking because that could let water inside.

No piece of dive gear is more important to keep in proper working condition than your reg. Inspect it carefully before every use, clean it thoroughly after diving, and have it serviced at intervals the manufacturer recommends.

— Roger Roy, ScubaLab Director

“Has the look and feel of a more expensive reg.”
— TESTER

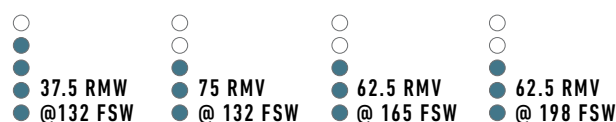


SEAC MX100

PRICE \$480 PRICE seacusa.com
DIAPHRAGM first stage

The nicely finished MX100 has lustrous chrome on the first stage, a braided hose, and an abrasion-resistant finish on the purge cover. The large, triangular purge cover is rigid and a little stiff in the center, but just a touch along one of the corners clears the reg easily. Divers rated the MX100 very good for ease of breathing in a swimming position, and for dry breathing in both normal and head-down positions, tying the top scores in those categories. In ANSTI testing, the MX100 performed very good at recreational depth and good to the depth limits of the test. Test divers found the Venturi lever well marked, effective and easy to operate, even though it's small and tucked in out of the way. The exhaust ports on the MX100 are quite short and curve in along the bottom, which helps make the second stage very compact and light but also seemed to allow a little extra bubble interference noted by some divers when vertical, although it wasn't noticeable when in a swimming position.

BREATHING SIMULATOR RESULTS



“No adjustment, but excellent ease of breathing.”
— TESTER

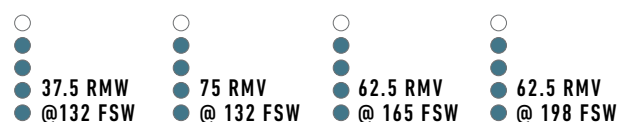


MARES PRESTIGE 15X

PRICE \$450 CONTACT mares.com
DIAPHRAGM first stage

The Prestige was the only reg in our test with no dive/predive switch, but like all modern regs, it uses the Venturi effect to reduce the effort needed to keep the diaphragm open when inhaling. The Prestige does this by way of an angled tube on the right side of the second stage leading to the mouthpiece inlet; it's an air bypass that creates a low-pressure vortex behind the diaphragm. It's a simple design and, our testing showed, an effective one. In ANSTI tests the Prestige recorded very good scores across the board, and in ergonomic testing divers reported no more tendency to free-flow at the surface than any of the other regs in the test. Divers rated the Prestige very good for ease of breathing in swimming position, ease of clearing and dry breathing, although some noted it breathed a bit wetter when head-down. Divers liked the second stage's light weight, its braided hose and its purge-cover design, which is effective and easy to use even when wearing gloves.

BREATHING SIMULATOR RESULTS



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PHOTOGRAPHER Shane Gross **LOCATION** Bimini, Bahamas

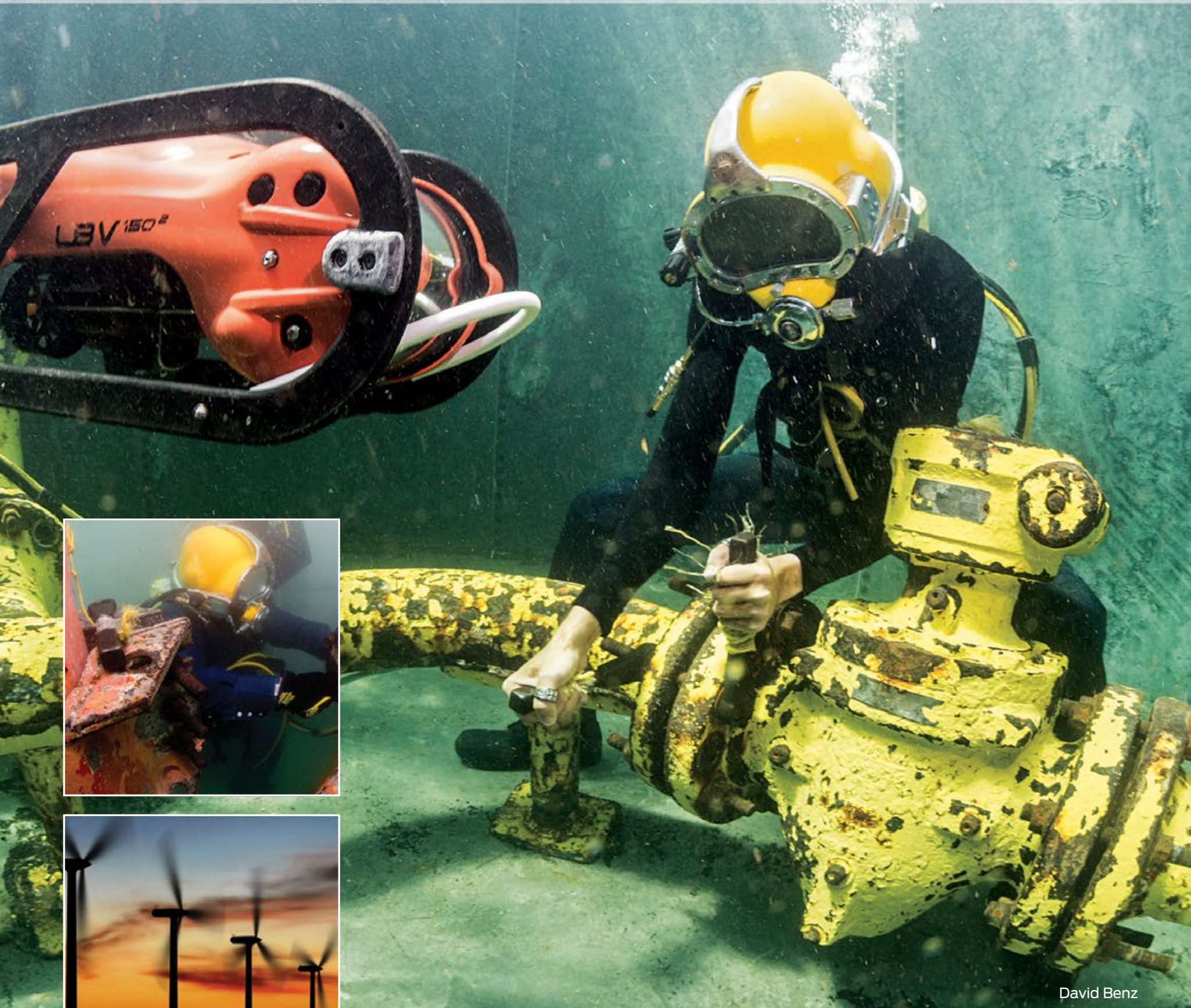
ABOUT THE SHOT Lying on my belly at the stern of the boat, I dipped half of my camera into the water, and this magnificent great hammerhead came up toward the surface. To get the shot, I used a Nikon D90 in an Aquatica housing set at $f/10$, $1/160$ sec and ISO 100, a Tokina 10-17mm fisheye lens, and two Sea&Sea YS-110a strobes. I exposed for the sunset, and placed one strobe under the water and the other above to illuminate the shark's dorsal fin.

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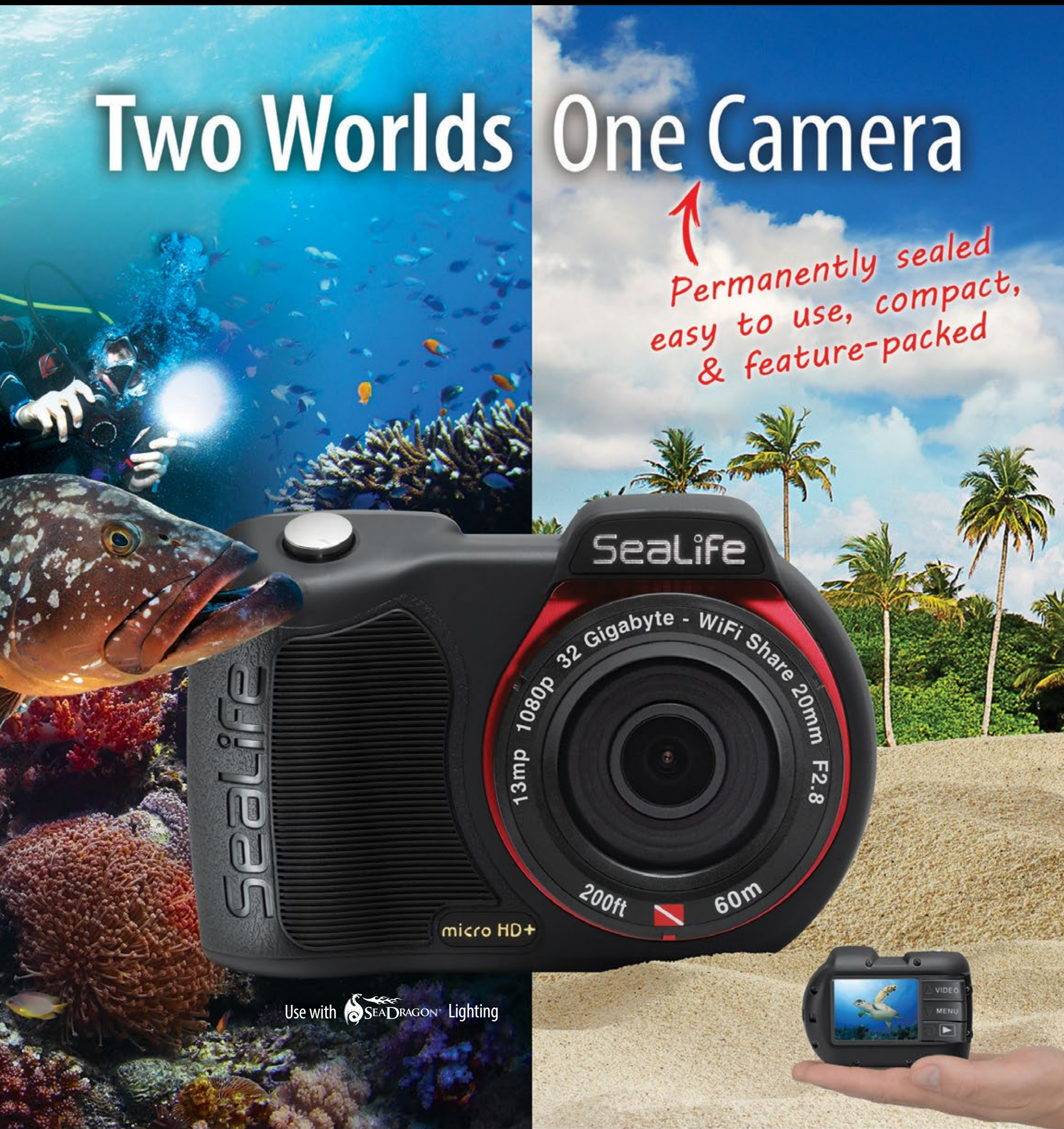
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